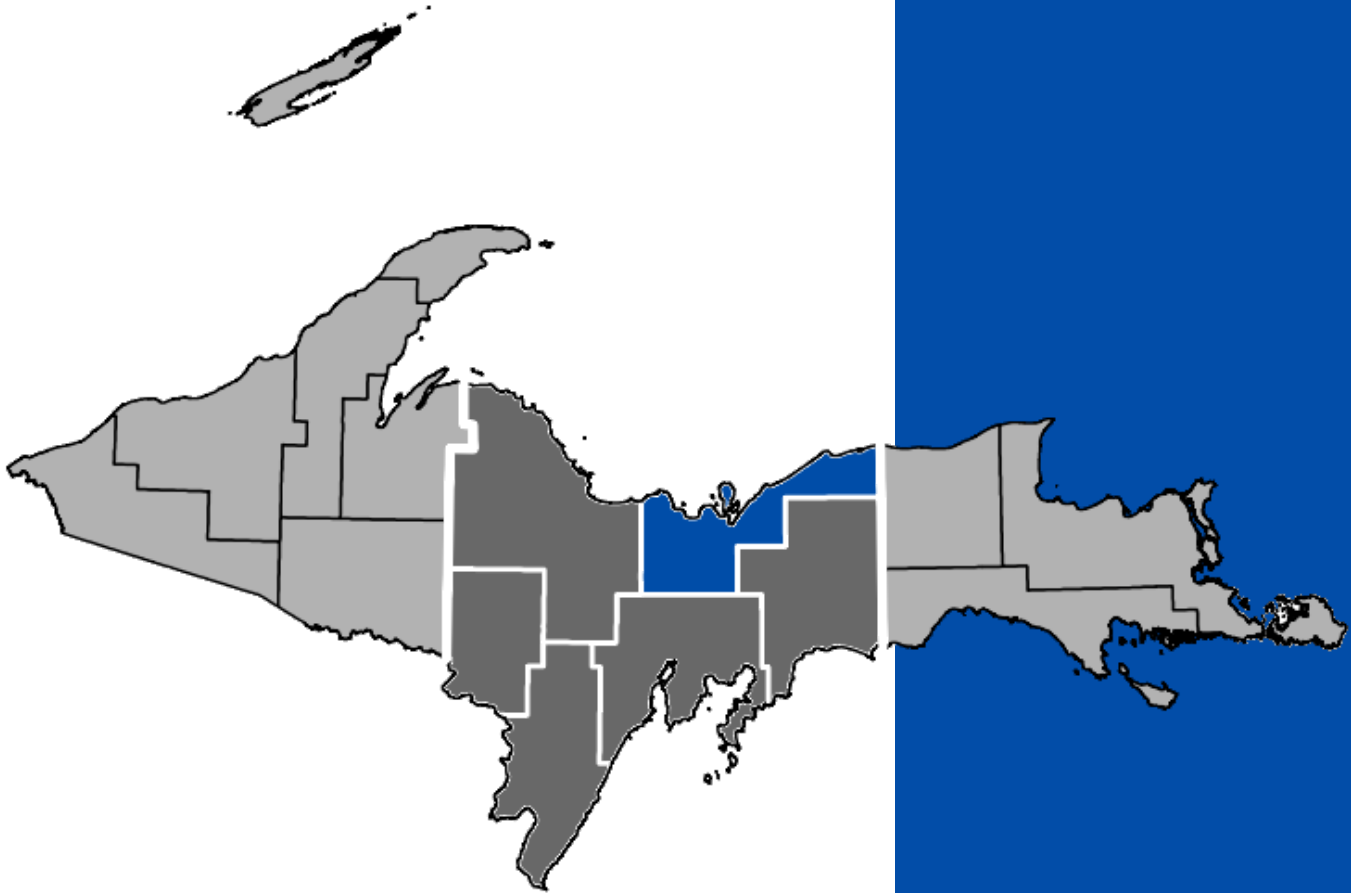


Alger County



Hazard Mitigation Plan - Update

2021

Prepared by:
Alger County Local Emergency Planning Committee
(LEPC)
and
CUPPAD Regional Commission



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1.0 Introduction

“Hazard Mitigation” is defined as any action taken before, during, or after a disaster to permanently eliminate or reduce the long-term risk to human life and property from natural and man-made hazards. Alger County has experienced various natural and man-made hazards such as severe whiteout conditions along M-28 and numerous ice and sleet storms that have closed schools and curtailed business activities.

Hazard mitigation planning is a process that assesses risks and evaluates the community vulnerability from potential hazards. Deficiencies are identified and strategies are developed that help mitigate problem areas. By developing an effective hazard mitigation plan a community can potentially reduce the affects of a future disaster. Potential effects of a disaster include loss of lives and property, environmental and economical concerns, and reduced essential services and quality of life. The result of this plan process is an Action Plan that identifies the appropriate steps to help mitigate present and future hazards.

Alger County’s Board of Commissioners adopted a hazard mitigation plan in 2007. This document serves as a five-year mandatory review and update of the Alger County Hazard Mitigation Plan. The plan was last reviewed and approved by FEMA in 2015.

1.1 Background

The Federal Emergency Management Agency (FEMA) provides hazard mitigation assistance to state and local governments and to individuals through programs under the Robert T. Stafford Act, Section 404 (Disaster Relief and Emergency Assistance). The Disaster Mitigation Act of 2000 (DMA2K) amended the Stafford Act, to require communities to have an approved Hazard Mitigation Plan in order to receive FEMA funding assistance.

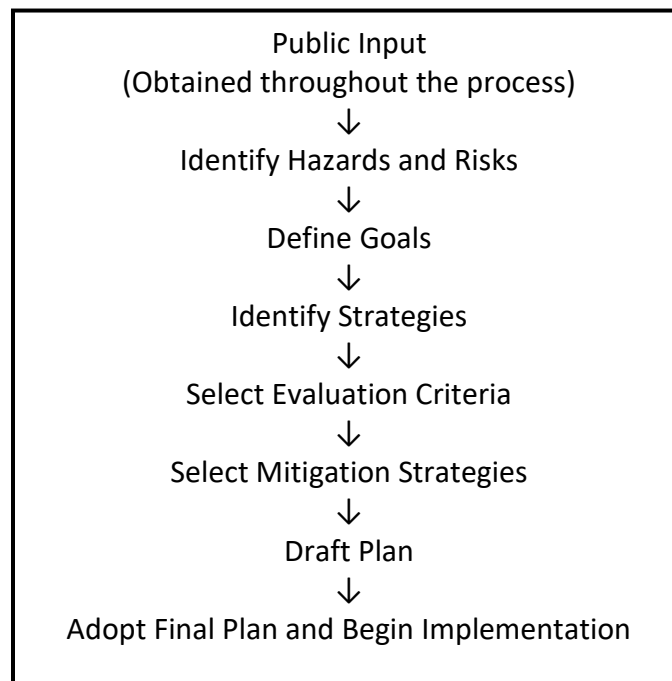
FEMA established project funding to develop local hazard mitigation plans. Part of these federal funds were allocated to the Michigan State Police/Emergency Management Division (MSP/EMD), which then re-granted funding to Michigan counties and major municipalities to develop local hazard mitigation plans. A hazard mitigation plan must be approved by FEMA for disasters declared after November 1, 2004.

Programs that provide federal assistance are: the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Program (FMAP), Pre-Disaster Mitigation Program (PDM), Emergency Management Performance Grants (EMPG), and Building Resilient Infrastructure and Communities (BRIC). FEMA’s Hazard Mitigation Grant Handbook describes these three grant programs in detail.

1.2 Plan Process

The Alger County Hazard Mitigation Plan process was given guidance by FEMA requirements and the Michigan Department of State Police-Emergency Management Division (MSP/EMD) document – Pub 207, Local Hazard Mitigation Plan Workbook. The plan process is outlined below:

Public Input is essential to the plan process in order to accurately understand the hazards faced by communities. Input into the plan was achieved through regular meetings and discussions with the County LEPC, Emergency Management Coordinator, local officials, and various agency personnel. Public participation takes place throughout the entire plan process and is described in more detail in Section 1.3.



The **hazards and risks** were identified through extensive research, meetings, surveys, and mapping. A community profile was first compiled to summarize the main components of the county and is explained in Section 2.0. Risks in the local units of government were described under three hazard categories: natural, technological, and social. A workgroup then rated the individual hazards to determine a high, moderate, or low level of risk. Section 3.0: Hazards explains what went into the process and Table 3.1 shows the results.

The **goals and strategies** focus on the higher-risk hazards determined in part by the hazard identification process. The hazards addressed are: severe weather, structural fires, wildfires,

and public health. Meetings and discussions with the LEPC, local officials, and agency personnel helped to suggest possible strategies to mitigate these hazards. Section 4.1 illustrates the issues, goals and strategies for each high-risk hazard.

The Emergency Management Coordinator and CUPPAD staff then **selected evaluation criteria** to rank the possible mitigation strategies. The criteria in Section 4.2 address strategies affecting large and small groups of people, recurring hazards, property damage, cost effectiveness, and natural resources. A subcommittee of the LEPC used the criteria to assign points and rank the **mitigation strategies**. Section 4.4 shows the results.

The **adoption of the plan and implementation** of strategies are addressed in Section 5.0-Action Plan. Each strategy or action to be taken is listed along with responsible agency and possible funding source. This section also addresses future plan maintenance through evaluating, monitoring and participating in the plan.

1.3 Revisions

The Alger County Hazard Mitigation Plan was revised beginning in 2013 so that area communities remain eligible for FEMA funds. Demographic information and hazard event statistics were updated where new information was available. Hazards and the corresponding mitigation strategies were re-prioritized, and some new mitigation strategies were added to the Action Plan. The plan update followed the same overall plan and public participation process as the original hazard mitigation plan.

In 2021, the Alger County Hazard Mitigation Plan was updated after the 2015 Plan was delayed due to the COVID-19 pandemic. Background, demographic, and hazard event statistics were updated where new information was available. Hazard rankings and corresponding mitigation strategies were discussed and updated with the local LEPC, and comments and strategies were solicited from local units of government. The update followed the same overall plan structure and public participation process as the previous hazard mitigation plans.

1.4 Public Participation

Participation by local governmental bodies and agencies and the general public is both a needed and required step in the plan process. Hazard mitigation is inherently a local issue. Therefore, local input about a community's risks can help in pinpointing projects to mitigate those risks. Also, FEMA requirements state that local jurisdictions that want to apply for federal mitigation funding must:

- Participate in the plan process
- Suggest potential projects

- Adopt the Hazard Mitigation Plan

Participation in the Alger County Hazard Mitigation Plan was achieved in many different ways. The following sections describe how local governments and the public participated in the hazard mitigation process.

At the onset of the planning update process letters were sent to all local units of government in Alger County notifying them of the hazard mitigation plan process and asking for their participation.

The Alger County Emergency Management Coordinator and the Local Emergency Planning Committee (LEPC) gave regular plan update guidance. Throughout the planning process, the LEPC provided valuable assistance reviewing materials and offering suggestions for improvement. During numerous meetings held with the group, the committee assisted in updating hazard rankings, discussing and developing strategies to respond to the identified hazards, and prioritizing the strategies. The committee meets monthly, with meetings open to the public. The LEPC consists of the following community representatives:

- Alger County Emergency Services
- Alger County Red Cross
- Munising Memorial Hospital
- Tri-County VFD
- Munising VFD
- Alger County Board of Commissioners
- Rock River Twp. VFD
- LMAS District Health Dept.
- Amateur Radio Emergency Service
- Munising Twp. VFD
- Burt Twp. Ambulance Corps
- Burt Twp. VFD

Meetings with local officials and the LEPC and topics of discussion are listed below:

MEETING DATE:	TOPICS/DISCUSSION:
March 31, 2003	Reviewed draft hazard analysis materials
April 8, 2003	Reviewed draft hazard analysis materials
June 10, 2003	Reviewed draft hazard analysis materials
June 8, 2004	Discussed vulnerability assessment draft materials
October 27, 2004	Reviewed Alger County Hazard Mitigation

	process, draft mitigation projects, past FEMA projects, and discussed evaluation criteria
June 30, 2005	Reviewed, evaluated, and prioritized mitigation strategies developed from “high risk hazards”. Discussed plan review process
2015 UPDATE	
January 13, 2013	Phone call with Alger County Emergency Management Coordinator to discuss plan update requirements.
October 30, 2013	Met with Alger County Emergency Management Coordinator to discuss process and plan update schedule.
March 12, 2014	Met with Alger County LEPC to review plan update process and rank hazards.
April 9, 2014	Met with Alger County LEPC to rank mitigation strategies.
April 30, 2014	Met with Alger County LEPC to continue ranking mitigation strategies.
May 28, 2014	Met with Alger County LEPC to review draft plan.
January 28, 2014	Met with Alger County LEPC to review revised draft plan and approve for public review.
2021 UPDATE	
January 2021	Met with Alger County LEPC to discuss to review update process and rank hazards
August 11, 2021	Met with Alger County LEPC to discuss plan updates and workflow
August 12, 2021	Worksheet sent to LEPC members to review hazard rankings and rank mitigation strategies
August 16, 2021	Letter sent to LUGs to review hazard rankings and solicit comments and mitigation strategies.
September 9, 2021	Met with Alger County LEPC to discuss plan updates.
November 8, 2021	Met with Alger County LEPC to discuss plan updates and review draft plan.

Letters were sent during each plan update to the individual township supervisors to solicit their ideas and suggestions on specific hazards in their communities as well as ideas on potential mitigation projects. For the 2021 update, these were sent August 16, 2021. Comments and responses received as a result of letter responses, meetings and phone conversations with

supervisors or a township board member are listed below. Several communities felt that the descriptions and strategies listed in the plan were sufficient so these jurisdictions are not listed.

JURISDICTION	COMMENTS/CONCERNS
Au Train Township	<ul style="list-style-type: none"> Au Train River flooding caused by sand shoaling from NW winds and Ice Dams. Could work with MDOT – USACOE, DEQ and the County Road Commission for maintenance dredging and/or emergency dredging. Forest Lake Dam needs warning system and hazard sign. Whiteouts from snowstorms and ice on the road from Lake Superior on M-28 from Scott Falls to Forest Lake Rd. Could repair the Orange Bridge on Woodland Ave. for an alternate route. Issue with curves on the Forest Lake Au Train Rd. by the Au Train Lake; could install safety rails.
Mathias Township	<ul style="list-style-type: none"> Drifting snow during snowstorms causing poor visibility and accidents at the M-67 and Hwy 41 intersection. Could install a snow fence and plant vegetation in the area to limit the amount of drifting. Potential loss of power at water tower and concern about safety of the water supply because of potential contamination. Could purchase a generator to mitigate power loss problem. Hazard of pesticides or fire at the Holmquist Feed Mill. Better coordination with F.D. and other agencies. High driver speeds on M-67 through Trenary. The Township has a caution light but it does not seem to slow drivers.
City of Munising	<ul style="list-style-type: none"> 2015 UPDATE: No additional comments
Onota Township	<ul style="list-style-type: none"> 2015 UPDATE: No additional comments
Munising Township	<ul style="list-style-type: none"> 2021 UPDATE: No additional comments
Au Train Township	<ul style="list-style-type: none"> 2021 UPDATE: Ranked Transportation Accidents higher-risk and Pipeline Failures, School Violence, and Tornadoes lower-risk than the LEPC.

Public review of updates to the Alger County Hazard Mitigation Plan was achieved through the following methods:

- A letter notified Alger County, LEPC, local governments and neighboring counties that the plan was available for review on the CUPPAD Regional Commission website: www.cuppad.org
- Draft Plan copy was made available to the Michigan State Police/Emergency Management Division.
- A copy of the Plan was made available for review at the Alger County Courthouse.
- A copy was made available for public review at the Munising Public Library.
- A notice was printed in the local newspaper about where local residents could review the plan.
- Comments received were reviewed for consideration and incorporated into the final draft plan.

1.5 Jurisdictions Participating in the Plan Update

The following jurisdictions in Alger County recognize the need for an approved Hazard Mitigation Plan. Statements of intent to participate in the planning process were filed by the following local units:

Unit of Government	Jurisdiction Plan Status	Date Signed
Alger County	Continuing Participant	08/05/2010
AuTrain Township	Continuing Participant	08/09/2010
Burt Township	Continuing Participant	08/10/2010
Village of Chatham	Continuing Participant	09/30/2010
Grand Island Township	Continuing Participant	08/22/2010
Limestone Township	Continuing Participant	10/01/2010
Mathias Township	Continuing Participant	09/09/2010
City of Munising	Continuing Participant	08/05/2010
Munising Township	Continuing Participant	08/18/2010
Onota Township	Continuing Participant	09/07/2010
Rock River Township	Continuing Participant	08/17/2010

2.0 Community Profile

This chapter provides an overview of Alger County in order to document its natural features, communities and infrastructure. Every attempt is made to consider existing conditions and emerging trends. Appendix A supplements the text information in this section for individual jurisdictions. Appendix F contains maps featuring different aspects of Alger County.

2.1 County Overview

Alger County abounds in natural beauty and is a major year-round tourist destination with more than 80 miles of Lake Superior shoreline, including the Pictured Rocks National Lakeshore. A large portion of the 918 square mile land area is within the Hiawatha National Forest, including Grand Island in Munising Bay. There are 266 inland lakes, over 600 miles of rivers and streams, and 17 waterfalls in the county. The population, estimated at 9,151 in 2019, is concentrated in the county seat of Munising and adjacent townships. Production of specialty papers and timber products lead the manufacturing sector. Total timberland in the county approximates 470,000 acres, two-thirds of which is hardwood forest (maple-birch and associated species). The largest county employers are the Alger Correctional Facility, Timber Products Michigan and Neenah Papers Corporation.

The geography of Alger County is illustrated in Map 1. The distribution of people in the county is in Map 2. Driving distances to Detroit and Lansing are 412 and 353 miles, respectively. Map 3 illustrates the different types of land cover within the county.

2.1.1 Local Governmental Units

All jurisdictions in Alger County are included in this Plan. Local governments in Alger County include eight general law townships, one village and one city. The City of Munising is the county seat and population center. A brief description and pertinent community information for each local government unit is included in Appendix A. A brief history of the county is also included in Appendix A.

Cities:

- Munising

Townships:

- | | | | |
|------------|------------|----------------|--------------|
| • Au Train | • Burt | • Grand Island | • Limestone |
| • Mathias | • Munising | • Onota | • Rock River |

Villages:

- Chatham

2.2 Geography

Alger County borders Marquette, Delta, Schoolcraft, and Luce Counties. Approximately 85 miles of Lake Superior shoreline mark its northern boundary. Inland lakes abound, with Au Train, Beaver and Grand Sable being the largest of 266 found in the county. Seventeen waterfalls add to the rich natural beauty of the area. The combined length of County rivers and streams is about 600 miles. Alger County's watersheds and topography are shown in Maps 4 and 5, respectively.

Approximately 17 percent of the County's land area is classified as wetlands in the Michigan Resource Information System (MiRIS). Wet soil conditions and steep slopes limit building development in many areas. Countywide, soils mostly consist of sand and gravel-based loam. Map 7 identifies floodplains and shoreline areas especially subject to erosion. Land cover/use is shown on Map 3.

Elevations range from 1,115 feet in southeast Burt Township to 600 feet along the Lake Superior shoreline. The elevations at Hanley Field in Munising Township and Grand Marais Airport in Burt Township are 984 feet and 838 feet, respectively.

2.3 Climate

July is the warmest month, and January is the coldest. Average daily maximum and minimum temperatures recorded at Munising for the month of July were 76.3 degrees and 53.0 degrees (Fahrenheit scale). Average maximum and minimum temperatures for July in Chatham were 78.4 and 52.4 degrees, respectively. The maximum and minimum average January temperatures for Munising were 24.9 and 9.0 degrees, respectively; the same measurements in Chatham were 24.4 and 7.3 degrees. High and low temperatures are greater at inland locations where the influence of Lake Superior is less. The growing, or freeze-free, period averages 106 days annually at Munising and 91 days at Chatham. Generally, the freeze-free period extends from early June through mid-September.

On average, September is the wettest month at both Munising (3.63 inches) and Chatham (4.16 inches). Precipitation amounts are lowest in February with Munising averaging 1.72 inches and Chatham 1.67 inches. Average annual snowfall at both locations nears 150 inches, most falling in the December-February period.

Afternoon thunderstorms are common during summer months on an average of 29 days. Although tornado activity has been recorded, it is infrequent since the county lies north of the Midwest tornado belt. Six tornadoes were recorded between January 1950 and December 2020. A tornado event in May 1964 was rated at a magnitude of F2 on the Fujita Scale (Table 2.1). Available data does not pinpoint the storm event location. Information on weather events is included in Appendix E.

Besides commercial radio and television outlets, NOAA weather radio transmitter stations provide up-to-the-minute information. Alger County can reliably receive NOAA weather

information from transmitter locations in Munising and Grand Marais. Additionally, signals can be received from Marquette (1,000 watts), Escanaba (1,000 watts), and Manistique (1000 watts). Portions of Burt and Munising Townships can receive information from the Newberry transmitter location (300 watts). NOAA weather radio coverage maps are included as Maps 8, 8A, 8B, and 8C. Warning sirens are located atop the City of Munising fire station and the Burt Township Fire Department fire station in Grand Marais. The sirens can be heard a distance of two miles.

2.4 Community Facilities and Organizations

A listing of major agencies and organizations that provide services within Alger County is presented in the table below.

Table 2.1 Community Facilities and Organizations, Alger County	
Alger County Chamber of Commerce	Business and tourist information/promotion
Alger County Economic Development Corporation	Business improvement and development
Munising Downtown Development Authority	Business improvement and development
Alger County Visitors Center	Tourist information
Pathways, Inc.	Counseling services; adult support services/activities
Michigan Works!	Employment and training services
Luce-Mackinac-Alger-Schoolcraft Health Department	Public health services
Michigan Department of Human Services	Child and family support services
Alger County Commission on Aging	Information and referral services
Hospice of Alger County	Counseling and support services
Women's Center	Counseling and support services
Alger-Marquette Community Action Board	Elderly and low-income services, housing assistance and Head Start
USDA Forest Service Ranger Station	Hiawatha National Forest management
Department of Interior, National Park Service	Pictured Rocks National Lakeshore management
Alger County Transit Authority	County-wide transportation
Alger County Road Commission	Road maintenance and snow removal
Michigan State University Extension Service	Family and community services
Sault Ste. Marie Tribe of Chippewa Indians	Health, housing and family services
American Red Cross, Superior Chapter	Disaster relief, training and communication
USDA Farm Service Agency	Agricultural disaster assistance
USDA Natural Resources Conservation Service	Natural resources management
USDA Rural Development	Development assistance programs
U.S. Postal Service	Mail service through Au Train (49806), Chatham (49816), Deerton (49822), Eben Jct. (49825), Grand Marais (49839), Munising (49862), Shingleton (49884), Trenary (49891)
Small Business Technology and Development Center	Small business counseling services
CUPPAD Regional Commission	Local government assistance
UPCAP	Elderly, housing and conflict resolution

Public Schools

Four designated public school districts provide elementary and secondary educational

opportunities. Boundary, instructional levels, and enrollment information is presented in Table 2.2.

Table 2.2 Public and Private Schools, Alger County			
Name and Location	District Description	Instructional Levels	2021 Enrollment
Munising Public Schools	City of Munising, Munising Township, Au Train Township., Onota Township, Grand Island Township.	K-12	
Munising High and Middle School	M-28 West, Munising	6-12	346
Mather Elementary School	411 Elm Avenue, Munising	K-5	271
Burt Township School Grand Marais	Burt Township	K-12	30
Superior Central School District Eben Junction	Village of Chatham, Rock River Township, Mathias Township, Limestone Township	K-12	338
Au Train-Onota Public Schools Deerton	Au Train Township, Onota Township	K-8	42
Munising Baptist School M-28 & Connor Road, Wetmore	N6285 Connors Road Wetmore	K-12	52
Seventh-Day Adventist School M-28, Grand Island Township	E8799 M-28 West Munising	7	4

Source: Marquette-Alger Regional Educational Service Agency

Head Start

Educational services through the Head Start program are provided by the Alger-Marquette Community Action Board at centers in Traunik and Munising.

2.4.1 Critical Services

Hospitals and Medical Clinics

Munising Memorial Hospital is located at 1500 Sand Point Road in the City of Munising. In October 2008 Munising Memorial Hospital opened a brand new, state-of-the art health care facility. The new facility spans 59,000 square feet and incorporates all aspects of patient care and medical offices under one roof. Bay Care Medical Center is located within the hospital building and has 18 exam rooms, 6 physician offices, and 2 procedures rooms.

Harbour View, a 20-bed assisted living facility built in 1999, is also located on the facility grounds. Harbour View offers a variety of living settings, including a choice of single room, luxury single room, a double room for couples and adjoining rooms.

Other hospitals in the region are UP Health System - Marquette, Schoolcraft Memorial Hospital (Manistique), Helen Joy Newberry Hospital (Newberry) and OSF St. Francis Hospital (Escanaba). Distances from selected Alger County locations are shown in Table 3.

A part-time medical clinic in Trenary receives patients on Tuesdays and Thursdays each week. Medical treatment is available in Grand Marais by appointment. The Sault Ste. Marie Tribe Health Center in Munising is open each weekday.

Table 2.3					
Road Distances from Select Alger County Communities					
FROM	TO				
	Munising	Marquette	Manistique	Newberry	Escanaba
Grand Marais	60	103	64	51	118
Munising	-	42	45	61	63
Trenary	28	33	58	87	35

Public Health

Programs and services dealing with the prevention and control of disease and environmental health hazards are provided by the Luce-Mackinac-Alger-Schoolcraft District Health Department, which maintains a local office in Munising.

Solid Waste

The private Wood Island landfill in Munising Township is the only licensed Type II sanitary landfill in the county. Type II licensing allows the facility to accept residential, commercial, industrial, and construction and demolition waste materials. Wood Island Waste Management, Inc. is the owner.

Waste materials generated within Alger County may be landfilled at the Wood Island facility or at the Michigan Environs facility in Menominee County, depending on the collection provider. Wood Island landfill receives solid waste from Alger, Menominee, and Schoolcraft counties.

Police and Fire Protection

Services provided by the Alger County Sheriff Department include road patrol, jail operation, E911 dispatch, ambulance, dive team, community correction, snowmobile patrol, rescue, and emergency management. Michigan State Police Post #81 in Negaunee provides coverage throughout Marquette and Alger Counties.

The Sheriff's Department operates a 52-bed jail on Park Street in the City of Munising. The Sheriff's Department has two road patrol officers.

Munising City Police Department provides 24-hour service within the City. The Munising Police Department is made up of four patrol officers and the Chief of Police.

Bomb detection and drug detection dogs are available through the Michigan State Police in Negaunee and the Escanaba Public Safety Department.

Eight local fire departments provide primary fire protection to Alger County homes and businesses. In addition, firefighting equipment and trained personnel are stationed at facilities of the U.S. Forest Service in Munising and the Michigan Department of Natural Resources in Shingleton. Fire departments and personnel strength are shown in Table 2.5.

Table 2.4	
Fire Departments, Alger County, 2021	
Department	Force Size
Au Train Township VFD	25
Burt Township VFD	13
Mathias Township VFD	18
Munising Township VFD	25
Onota Township VFD	7
Rock River VFD	19
Munising VFD	23
Tri-County VFD (private)	9

Emergency Medical Service

Emergency medical services are provided primarily through the Alger County Ambulance Service, a part of the Alger County Sheriff's Department. One mill is levied in the County to support the operations of the department and was last renewed in 2020. The county maintains four ambulances, two Advanced Life Support transporting ambulances and one Basic Life Support transporting ambulance based at the Sheriff's Department in Munising. The Munising-based ambulances are auspices of the Alger County Medical Control Authority at Munising Memorial Hospital. The ambulances provide basic and emergency medical services and are staffed with paramedic and EMT personnel.

Depending on the nature of the call and who may call for service, advanced life support from UP Health System - Marquette Hospital may respond.

2.5 Culture and Community Profiles

The information that follows provides a brief description of community names that commonly appear on road maps. Some still have a resident population or commercial enterprises that give them a physical identity. Others existed during an earlier time and were abandoned as economic changes occurred.

Au Train:	The original county seat was here. In 1901 or 1902 the county seat was moved to Munising. Residential and commercial development is concentrated in the community and includes a bank, post office, and township facilities. The Duluth, South Shore and Atlantic (later known as Soo Line, then Wisconsin Central) rail line between Marquette and Munising was discontinued and has been removed. The Au Train River mouth along highway M-28 is a popular summertime recreation area.
Chatham:	Chatham was incorporated as a village in 1964 to allow for the financing of a public water supply system. Agricultural research facilities of Michigan State University are located within the village boundaries and consume about 30 percent of the village land area.
Christmas:	Until platted as the unincorporated village of Christmas in 1940, the community was known as Onota. Onota was the county seat of Schoolcraft County when it included present day Alger. It was a railroad station and near the charcoal furnaces at the preserved Bay Furnace site. Christmas has a collection of businesses and residences along highway M-28. Development of the Kewadin Casino is a major attraction.
Deerton:	This settlement was a station along the DSS&A rail line just south of M-28. The Au Train-Onota School and scattered residences remain.
Eben:	The community of Eben is centered immediately west of Eben Junction and is marked by a small collection of residences along highway M-94.
Eben Junction:	This settlement is located at what was once an interchange of the Soo Line Railroad spur from Rapid River and Lake Superior & Ishpeming Railroad from Marquette County to Munising. County road H-01 intersects with highway M-94 at this location. The community is marked by a small collection of residences and businesses.
Forest Lake:	Once a station on the Munising, Marquette & Southern Railroad 13 miles southwest of Munising.
Grand Marais:	The natural harbor was first used by native tribes as a haven. Early European explorers established a fur trading post here. The first attempt at settlement occurred in 1850-51; permanent settlement came 20 years later. A government lighthouse, post office and significant fishing industry came into being in mid to late 1870s. Around the same time, the first sawmill in the community was built and was served by a narrow gauge railroad. By 1910 the village was home to some 65 businesses and 2,500 people. A public water system was installed around 1900. The most recent system upgrade was completed in 1978 and included installation of a new well and rehabilitation of the existing one. Currently, about 300 customers are connected to the system. Today, Grand Marais is small settlement with a heavy tourist orientation due to its many natural attractions including the Pictured Rocks National Lakeshore.

Kiva:	Once a small settlement on the Whitefish River in Limestone Township.
Limestone:	This settlement today includes several commercial establishments, the Township Hall and a few homes along highway M-67 between Chatham and Trenary. It was settled in 1889 and named for the limestone bed of nearby Johnson Creek.
Melstrand:	This former settlement is found at the junction of H58 and H52.
Munising:	Munising was incorporated as a village circa 1896 and became the county seat in 1902. The village incorporated as a City in 1915. It is the commercial and population center of Alger County.
Rumely:	Located midway between Sundell and Eben Junction along highway M-94 and the former LS&I Railroad line. A general store is the settlement's only commercial establishment. The settlement includes a few scattered residences.
Shingleton:	The community is at the intersection of highways M-94 and M-28. Canadian National Railway's line from Trout Lake to Munising parallels M-28 on its south side. A small residential population and several commercial establishments remain in this once-booming lumber town.
Sundell:	Located 8 miles west of Chatham, the settlement of Sundell was once a railroad stop with its own post office.
Traunik:	This community was settled by immigrants from Slovenia around 1900 attracted to available work in mines and lumber camps. The Slovenian hall and other buildings marking the settlement are found at the intersection of county roads H-01 and H-44.
Trenary:	Trenary was settled as a mill town and eventually was surrounded by a large farming community. A small concentration of commercial establishments is found along the main street and M-67 in the town area. Additional commercial activity is found along highway US-41. A community water system was completed in 1991 and includes two 8-inch diameter deep wells (480 feet each), a 50,000 gallon elevated storage tank, and 11 hydrants. The system includes approximately 75-metered services.
Van Meer:	A former station on the Munising, Marquette and Southeastern Railroad east of Munising.
Wetmore:	Sometimes referred to as <i>Old Munising</i> , Wetmore was a station location of the Duluth South Shore and Atlantic Railroad. The settlement was named for Fred Wetmore, a local land investor.

2.6 Housing

The Census Bureau estimated a total of 6,691 housing units in Alger County in 2019. Occupied housing units accounted for about 45 percent (3,007) of the total stock. Eighty-four percent of these were owner-occupied and had an average household size of 2.80 persons. Household size among renter-occupied units averaged 2.16 persons. Single-unit detached structures comprise 86.3 percent of the total housing units. Mobile homes make up 6.3 percent.

The vacancy rate of rental units was 9.6 percent. Among the 3,684 vacant units, 2,155 were identified as seasonal, recreational or occasional use dwellings. In other words, nearly two-thirds of the unoccupied housing units are used as camps or cottages. Many of the housing units in Burt, Grand Island and Onota Townships fall into this category.

Housing structures built before 1960 account for 27.4 percent of the housing stock in Alger County. 43.8% are heated with natural gas and about 27.7 percent with propane. Additional primary heating sources include wood (16 percent), electricity (6.4 percent) and fuel oil (3.5 percent).

The construction standards of many seasonal units are not known. Roads to such structures are generally constructed to meet the needs of occasional usage. Road widths, curves, grades and base sufficiency may be problematic for emergency vehicles. Building permits for the entire county are issued by the Alger County Building Codes Department. Zoning permits, where applicable, are issued by local governmental units.

There is one state licensed adult group home in Alger County with a capacity of 6 persons. Residents may be developmentally disabled, elderly, or diagnosed with Alzheimer's or other mental illness.

Publicly-subsidized housing complexes are listed in Table 2.5.

Table 2.5 Subsidized Housing Units, Alger County			
Name	Location	Year Built	Description
Chatham Manor Apartments	Gladstone Street Chatham	1990	Elderly (11) 1-bedroom (1) 2-bedroom
Grand Marais Senior Apartments	101 Everett Street Grand Marais	1995	Family (13) 1-bedroom (1) 2-bedroom
Jericho House Apartments	410 Elm Avenue Munising	rehabilitation structure	Elderly (15) 1-bedroom
Lakeshore Manor	200 City Park Drive Munising	1974/1983	Elderly & Detached Family (56) 1-bedroom (E) (2) 2-bedroom (E) (4) 2-bedroom (DF) (12) 3-bedroom (DF)
Windjammer Greene Apartments	1548 Center Street Munising	1982	Family (12) 1-bedroom (12) 2-bedroom

Source: Michigan State Housing Development Authority Directory

2.7 Public Infrastructure

The City of Munising maintains a wastewater collection and treatment system. The wastewater treatment plant can treat one million gallons per day and typically treats 200,000 to 300,000 gallons less than the rated capacity. Much of the collection system serves about 1,100-metered customers that include nearly all of the City's residents. Alger Correctional Facility in Munising Township is connected to the City's sewer system. The inmate population is about 400. Some areas of the City are not connected to the sewer system and use on-site septic systems. This arrangement is permitted if the dwelling is located more than 200 feet from the existing infrastructure. Those areas north of the hospital, along Connors Road, Cemetery Road, St. Martin Road, Gage Road and West Shore Drive are using on-site systems.

A wastewater collection system serves the Village of Chatham through approximately 70 residential and business connections. Seepage cells and lagoons are used as the means of treatment.

Public water systems serve the City of Munising (about 1,100 connections), Village of Chatham (about 150 connections) and communities of Grand Marais (about 300 connections) and Trenary (about 75 connections). In all cases, water is drawn from wells and stored in elevated storage tanks.

Electrical service is provided by Alger-Delta Cooperative Electric Association, Upper Peninsula Power Company (UPPCO), and WEC Energy Group (Wisconsin Electric).

Telephone service is provided by Hiawatha Communications and national wireless service providers.

Where available in Alger County, natural gas service is provided by DTE Energy.

Wood Island landfill in Munising Township has Type II licensing (household waste) and is the only such facility in Alger County.

2.8 Areas of Land Use Conflict

Waterfront development pressures are converting natural areas to homes and cottages at a rapid rate. Moreover, some properties previously used for vacations or special seasons exclusively, have been converted for year-round living. Private road construction may not be adequate for emergency vehicle access or year-round usage.

Land use trends in Alger County indicate residential development occurring along lakes, rivers and adjacent to major roads. Commercial and industrial development is also tied to major roads and to population centers such as the City of Munising and the Village of Chatham.

Future trends show that residential development will continue to follow existing roads and will be clustered around lakes and rivers. Commercial and industrial development will be

concentrated in currently existing population centers. Additional development will most likely occur on non-forest, upland forest and agricultural lands. Areas of land use conflict may be minimized through the utilization of local zoning.

2.9 Historic Resources

The Alger County Heritage Center maintains historical records, memorabilia and artifacts for public viewing. It is in the former Washington School on Washington Street in Munising.

County sites included on state and national listings of historic places are found in Appendix B.

2.10 Transportation

Highways M-28, M-94, US-41 and M-67 are the most heavily traveled roadways in the county. Highway M-77 and Federal Forest Highway 13 are vital links to northern and southern parts of the county. Total state trunkline mileage within the county is 105.4 miles. Alger County's annual average daily traffic is recorded in Map 6.

There are 29 road bridges in Alger County including some that have been closed for safety reasons. Structural evaluations are required every two years.

County, local, City/village and federal road mileage totals are as follows:

- County primary 198.75 miles
- County local 294.7 miles
- City/village major 9.1 miles
- City village minor 15.8 miles
- Federal 235.0 miles

Annual average daily traffic volumes as recorded by the Michigan Department of Transportation in 2020 are as follows:

- M-28 (City of Munising) 8,430
- M-28 (near south City limit) 6,941
- M-28 (near north City limit) 5,430
- M-28 (west of Shingleton) 2,647
- M-28 (Au Train) 3,302
- M-28 (near Marquette County line) 3,302
- M-94 (east side of Chatham) 1,678
- US-41 (Kiva) 1,772
- M-67 (Trenary) 1,131
- M-94 (west side of Chatham) 1,210
- M-77 (south of Grand Marais) 762

Census data indicates time spent commuting to work increased from an average of 16.4 minutes in 1990, to 18.4 in 2010, and an estimated 25.3 minutes for Alger County residents in

2019.

County-wide public transportation is provided by the Alger County Transportation Authority (ALTRAN). Dial-a-ride service is available 7 days a week 6am-12am, and a weekday shuttle transports passengers between Munising and Marquette 3 times a day. Senior citizens and disabled persons comprise the majority of the system's annual ridership, but the service is also used by school-aged children and college students commuting to Northern Michigan University.

County-owned Hanley Field (elevation 984 feet) is located south of Wetmore in Munising Township. This site has been used for aviation since 1928. It is operated seasonally from May 1 through October 15. The turf runway is 4,000 feet in length and 120 feet in width. It is licensed by the Michigan Department of Transportation, Bureau of Aeronautics as a "general utility" airport. There are no fixed base operators and commercial flights are limited to area sightseeing. Fuel is not available at the facility. Burt Township Airport (elevation 838 feet) is licensed as a "basic utility" airport. It has two turf runways of 2,800x100 feet and 2,600x150 feet. The airport is closed from October 15 to May 15. Fuel is not available at the facility.

Tracks owned by Canadian National run parallel to M-28 from the east with the line ending in the City of Munising.

2.11 Economic Characteristics

Manufacturing, recreation and food services, and education, and health and social services account for 50.9 percent of all jobs in Alger County (Table 2.6). The largest county employers are Neenah Papers (paper products), Timber Products Michigan and the Michigan Department of Corrections (Alger Correctional Facility). A listing of the largest employing entities is provided in Table 7.

Table 2.6		
Percentage of Employed Persons by Industry, 2019 (est.)		
Industrial Category	Alger County	Michigan
Agriculture, forestry, fishing and mining	4.0	1.4
Construction	6.0	4.8
Manufacturing	14.9	16.5
Wholesale trade	1.3	2.5
Retail trade	11.7	11.9
Transportation and utilities	4.2	4.1
Information	2.1	1.7
Finance, insurance and real estate	2.5	5.5
Professional, scientific, management, administrative, and waste management services	6.7	9.0
Educational, health and social services	16.5	24.3
Arts, entertainment, recreation, accommodations and food services	19.5	9.5
Other public services	3.7	4.9
Public administration	7.0	3.9

Source: Table DP-03 Selected Economic Characteristics, American Community Survey Estimates 2019.

Table 2.7
Largest Employers, Alger County 2021
Neenah Paper, Inc. (formerly Munising Mill)
Alger Correctional Facility
Timber Products Michigan
Christmas Kewadin Casino
Munising Memorial Hospital
Munising Public Schools
Superior Central Schools
Family Fare Supermarket
Alger County
People's State Bank
Pictured Rocks National Lakeshore
Trenary Home Bakery

Alger County's 2019 workforce - both employed and unemployed - was estimated at 3,283. Historically, Alger County unemployment rates exceed those of the state overall but are comparable within the region. Average unemployment rates for 2019 are as follows:

- Alger County 5.2%
- Upper Peninsula 6.34%
- Michigan 4%
- United States 3.6%

Per capita income for 2019 was \$20,851; the statewide figure was \$49,238. Median household income for 2019 was \$45,570 compared to \$59,584 for Michigan overall. The percentage of Alger County residents with incomes below the poverty level was 11.2 percent for 2019 while the statewide rate was 13 percent.

2.12 Population

Table 2.8 shows the population for all Alger County municipalities from 1940 to 2010. Munising Township experienced the largest overall population increase at 178.0 percent, with Au Train Township falling close behind at 143.7 percent. Munising Township's growth over the past decade was influenced by construction of the new correctional facility. Au Train Township may have experienced an influx of population in part years due to the high percentage of seasonal residents who make the Township their home for a portion of the year. Many area township populations have increased due to an out-migration of residents from urban to rural areas. The largest overall population decline was recorded in Limestone Township (47.2 percent).

Table 2.8										
Population, Selected Areas, 1940-2019*										
Governmental Unit	1940	1950	1960	1970	1980	1990	2000	2010	2019*	% Change 1940-2019
Au Train Township	467	529	508	545	928	1,047	1,172	1,138	1,019	118.2%
Burt Township	570	624	457	424	539	508	480	522	411	-27.9%
Chatham Village	-	-	275	246	315	268	231	220	193	-
Grand Island Township	31	73	40	32	23	21	45	47	35	12.9%
Limestone Township	829	535	330	302	373	334	407	438	392	-52.7%
Mathias Township	827	726	742	644	680	563	571	554	532	-35.7%
Munising City	4,409	4,339	4,228	3,677	3,083	2,783	2,539	2,355	1,986	-55%
Munising Township	1,073	1,412	1,408	1,614	1,963	2,193	3,125	2,983	2,865	167%
Onota Township	234	293	183	128	228	244	310	352	371	58.6%
Rock River Township (w/ Village of Chatham)	1,727	1,476	1,354	1,202	1,408	1,279	1,213	1,212	1,231	-28.7%
Alger County	10,167	10,007	9,250	8,568	9,225	8,972	9,862	9,601	9,151	-10%

Source: U.S. Census Bureau for years cited, *2019 estimated

In the 30-year period ending in 2010, the median age of county residents increased by 13.4 years. Generally, median age rises with distance from the population center. This is largely attributable to the living preferences of persons with no children, many of who are retired. Median age information is presented in Table 2.9. Population graphs for Alger County and each local governmental unit are included in Appendix A.

Table 2.9						
Median Age, Selected Areas, 1980-2010						
Area	1980	1990	2000	2010	2019*	Change 1980-2019
Au Train Township	30.1	36.2	42.3	51.7	56.5	+26.4
Burt Township	42.2	48.1	56.7	62.9	69.2	+27
Chatham Village	--	36.2	40.8	42.5	49.0	--
Grand Island Township	42.5	37.5	45.8	50.5	45.9	+3.4
Limestone Township	32.8	37.8	45.5	51.5	59.7	+26.9
Mathias Township	31.6	39.9	44.6	49.1	57.8	+26.2
Munising City	34.3	39.7	43.8	45.7	39.8	+5.5
Munising Township	28.7	32.4	35.2	37.5	38.7	+10
Onota Township	31.4	38.6	49.8	57.5	61.5	+30.1
Rock River Township	29.9	36.1	42.3	46.3	50.9	+21
Alger County	31.6	36.7	41.2	45.0	49.5	+17.9
State of Michigan	28.8	32.6	35.5	37.6	39.8	+11
United States	30.0	32.9	35.3	37.2	38.5	+8.5

Source: U.S. Census Bureau for years cited, *2019 estimated

3.0 Hazards

Alger County is subject to a wide range of natural and man-made hazards every year, therefore, an all-hazards approach was taken with mitigation planning. Research and identification of hazards was an extensive process, which gathered input from local officials and residents of Alger County.

Section 3.1 describes the hazard rating and ranking process. The results of this process guided the determination of risk and vulnerability. Section 3.2 describes what risk and vulnerability assessments are and why they are done. Section 3.3 describes each hazard and provides a corresponding risk/rank and vulnerability statement.

3.1 Hazard Rating and Ranking

Generally, hazards of all types were evaluated according to **probability of future occurrence**, **impact** (overall effect on community), and **extent** (magnitude of impact). Specifically, the following factors were used to evaluate hazards:

1. Casualty Potential
2. Percent of Population Affected
3. Likelihood of Occurrence
4. Capacity to Cause Physical Damage
5. Size of Affected Areas
6. Corollary Effects

Local residents from business and industry, police and fire agencies, emergency services, education, public health, medical services, transportation, planning and zoning, and local elected officials participated in a series of reviews and discussions. Hazards were evaluated and ranked according to the above factors. As such, each ranking takes into account the probability of future occurrence, impact, and extent of hazards. Some two-dozen residents in all participated in the process.

In 2020-21, the Alger County Local Emergency Planning Committee (LEPC) revisited the rankings and, using qualitative and quantitative analysis, decided to revise the order of some hazards. Additional hazards were also added and ranked using this process.

The county hazard ranking and risk rating for both 2007 and 2014 plan revisions are shown in Table 3.1. The rating points reflect an order of importance as a threat within the County with higher points equating to higher risk. Appendix C gives more detail into the methodology of the hazard rating and ranking.

3.2 Risk and Vulnerability Assessments

The risk and vulnerability assessments are closely related steps in the hazard analysis process. Both assessments were used to analyze hazards in Alger County.

Risk Assessment is a description and/or map of hazards in the community to provide an idea of how often they arise and how much harm they might do in the future. Through risk assessment, each hazard is addressed to one of three basic degrees of assessment:

Cursory Assessment – is a short statement explaining why a particular hazard is not considered a threat. This type of statement is applied to low-risk hazards.

Standard Analysis – is one in which readily available information is gathered, evaluated, and explained using text and maps as appropriate but for which no special evaluation techniques were used. Explanations of this type are applied to moderate or high-risk hazards.

Advanced Analysis – includes application of theoretical or expert knowledge that requires significant time, expense, and training to be applied. This type of analysis is reserved for the highest-risk hazards and is used if the appropriate expertise is available.

Vulnerability Assessment gives quantitative estimates of the people and property in the community that are vulnerable to each hazard. Examples would be the number of people at risk, structures vulnerable to damage, key services affected, and estimates of cost.

In mitigation planning, professionals have not been able to reach agreement on where risk assessments end and vulnerability assessments start. Often these two types blend together. The risk and vulnerability assessments for Alger County hazards were combined and entered under the heading *Vulnerability*.

Table 3-1 ALGER COUNTY HAZARD RATING					
Hazard	Rating Score	2007 Ranking	2014 Ranking	2021 Ranking	Risk
Snowstorms	7.45	3	1	1	HIGH
Ice & Sleet Storms	8.05	1	2	2	
Temperature Extremes	7.50	2	3	3	
Severe Wind	6.10	6	8	4	
Wildfires	5.40	9	4	5	
Infrastructure Failures	6.60	4	5	6	
Public Health Emergencies	5.65	8	10	7	
Structural Fires	5.85	7	6	8	
Transportation Accidents	5.00	13	9	9	

Table 3-1 ALGER COUNTY HAZARD RATING					
Active Shooter Events	NA	NA	NA	10	MODERATE
Cybersecurity	NA	NA	NA	11	
Lightning & Thunderstorms	4.85	14	7	12	
Public Assembly Events	5.05	12	11	13	
Mass Casualty Events	NA	NA	NA	14	
Drought	6.30	5	16	15	
Riverine Flooding	4.35	16	12	16	
Other Environmental (invasive, exotic, diseases, etc.)	4.75	15	17	17	
Economic Recession/Adversity	5.25	11	15	18	
Hazardous Materials Accidents - Transportation	4.35	16	13	19	
Hail	4.35	16	14	20	
Petroleum Pipeline Failures	1.35	28	18	21	
School Violence	1.80	25	22	22	
Hazardous Materials Accidents - Fixed Site	3.55	20	19	23	
Tornadoes	5.40	9	20	24	
Dam Failures	3.10	23	21	25	LOW
Great Lakes Flooding	3.15	22	26	26	
Civil Disturbance	2.55	24	25	27	
Workplace Violence	1.80	25	24	28	
Bioterrorism	3.50	21	23	29	
Urban Flooding	1.00	29	27	30	
Terrorism, Sabotage, WMD	3.95	19	28	31	
Scrap Tire Fires	1.40	27	29	32	
Subsidence	1.00	29	30	33	
Earthquakes	1.00	29	31	34	
Nuclear Power Plant Accidents	1.00	29	32	35	

3.3 Hazard Analysis

Hazards in the following sections are divided into three categories: natural, technological, and social. Discussion of each hazard includes a definition, vulnerability statement, and information about the hazard's **extent** and **impact**. Additionally, discussion of each hazard addresses the **probability** of future hazard events in Alger County.

Sources

Weather events reported in this document are sourced from the National Oceanic and Atmospheric Administration (NOAA) National Center for Environmental Information (NCEI). The NCEI Storm Events Database contains various types of storm reports from January 1950 to the present. NCEI receives Storm Data from the National Weather Service (NWS). The National Weather service receives their information from a variety of sources, which include but are not limited to county, state and federal emergency management officials, local law enforcement officials, Skywarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public. Appendix E contains details about weather events in the county.

Storm Data is an official publication of the NOAA, which documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. In addition, it is a partial record of other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occurs in connection with another event. Some information appearing in Storm Data may be provided by or gathered from sources outside the NWS, such as the media, law enforcement and/or other government agencies, private companies, individuals, etc. An effort is made to use the best available information but because of time and resource constraints, information from these sources may be unverified by the NWS. The NWS makes a best guess using all available data at the time of the publication. Consequently, these data should be viewed as estimates and not hard figures.

3.3.1 Natural

Hazards caused by wildfires, flooding, severe meteorological events, and unstable ground will be addressed in this section. Unstable ground includes areas affected by mining and excavation.

Wildfires

Hazard description: An uncontrolled fire in grasslands, brushlands or forested areas.

Risk: HIGH

Rating: 5th

Human activity is responsible for 90 percent of wildfires; lightning strikes cause less than 10 percent. Debris burning and carelessness are the largest causes. Wildfires can be categorized by those that threaten public safety and those that threaten natural resources, e.g., timbered areas. Given the vast amount forestland in Alger County, wildfires pose a significant risk.

As a larger number of rural homes and seasonal dwellings are being built in wildland areas, there is a greater potential for life and property loss.

Between 2007-2020, Michigan's 6,127 wildland fires consumed a total of 86,341 acres. The fire season in 2012, during a moderate drought, produced over 700 fires and burned over 28,000 acres. Springtime before green up is typically the busiest time for firefighters with grass and brush fires. The threat in forested areas increases during summer months as weather is a critical factor. Fire ignition sources are abundant - trains, off-road vehicles, farm equipment, trees falling on power lines, human activities and many others.

During the same time period, the MDNR Fire Management division reported that there have been 38 wildland fires (2.7/year) that burned 152 acres in Alger County. The eight local volunteer fire departments coordinate response with firefighters from the MDNR station in Shingleton and US Forest Service office in Munising.

The National Weather Service provides fire weather forecasts to federal agencies in the area. A local office for the Upper Peninsula is in Marquette. During periods of high fire danger, the NWS prepares a daily Wildfire Potential Statement. The economy of the county is largely natural resource based. Given the vast amount of forestland, wildfires are a moderate to high-risk hazard in the county.

Vulnerability: Approximately 75 percent of Alger County's land area is forest covered. Coniferous (upland and lowland) species, which are of greater concern because of flammability, comprise about 25 percent of the forested area. Map 3 shows the extent of forest cover including wetlands and grasslands. A significant increase in the number of visitors to Pictured Rocks National Park and other tourism areas have increased the possibility of fires caused by inexperienced or ignorant campers.

Extensive state, federal and private commercial forest ownership is a major limiting factor to development in the county. Critical facilities are fairly well isolated from fire danger areas and have sufficient fire protection nearby.

Table 3.2		
Wildland Fire Vulnerability		
A Affected Area	B Annual Chance	C Average Wildland Fire Size
(All wildland within the county)	$(2.7 \text{ fires/yr}) / 365 = .0073$	152.35 total acres / 39 total fires
75%	5.4%	3.9 acres

Flooding

Hazard description: A rising or overflowing of a body of water caused by rapid snowmelt, excessive precipitation, ice buildup, storm surges, wind or sustained high water levels.

Floods are a natural occurrence. They are also the number one weather-related killer in the nation. The National Weather Service uses the following terms to describe flooding severity:

- **Flood Watch** is the first of two basic advisories issued by the NWS. A flood watch is issued when conditions are such that there is a threat of flooding, but the occurrence is neither certain nor imminent. The advisory does give a community an early notice of potential flooding.
- **Flood Warning** is the second basic advisory issued by the National Weather Service. A flood warning is issued when flooding is occurring or flooding conditions are expected to develop. In some cases, the flood warning will be for a specific river or for a height in feet. The NWS tries to issue flood forecasts with an accuracy of plus or minus one foot; however, many variables can contribute to this forecast. Some of the variables are difficult to predict yet have great impacts on flood forecasts.
- **Small Stream Advisory** means to be alert regarding potential flooding of small streams, streets, urban storm drains, underpasses, and low-lying areas.

The NWS uses the following terms to describe flooding severity:

- Minor Flooding - minimal or no property damage; possibly some inconvenience.
- Moderate Flooding - inundation of some secondary roads; suggest transfer to higher ground; some evacuation may be necessary.
- Major Flooding - extensive inundation and property damage; evacuation of people and livestock and closure of primary and secondary roads is likely.

Development within identified floodplain areas assumes a certain risk. A flood event can destroy or damage property, disable utilities, inundate roadways and bridges making them impassable, and affect agricultural lands. Furthermore, flooding can be life threatening and impede emergency services. The natural capacity of watersheds to retain and release moisture is altered by development that creates impervious surfaces and/or changes natural drainage patterns.

State regulations require a permit for any occupation, construction, or filling or grading within the floodplain of a river, stream or drain. The lowest floor of structures (including basements) must be elevated to or above the 100-year flood elevation. Flooding severity is expressed in terms of frequency, i.e., 10-year, 50-year, 100-year and 500-year flood. Realistically, these flood frequencies represent the chance in any given year of experiencing a flood event. For example, a 100-year flood has a one percent chance of happening each year.

Flood hazard maps illustrate susceptible areas when a stream reaches full-bank level. The

average Michigan floodplain map is over 20 years old. Change within a drainage basin (development) affects natural water storage capacity with a resultant increase in both the area and severity of the potential flood areas. Alger County's flood and high-risk erosion zones are included as Map 7.

FEMA's National Flood Insurance Program (NFIP) allows participating communities to purchase flood insurance. Local government units in Alger County who participate in NFIP are: Au Train Township, Burt Township, the Village of Chatham, and the City of Munising (see Table 3.3). Onota Township does not participate although special flood hazard areas have been identified. Floodplain mapping used in conjunction with the National Flood Insurance Program has been completed for Au Train Township, the Village of Chatham, and Onota Township.

Table 3.3 National Flood Insurance Program Participants, Alger County, 2021				
Community Identification Number (CID)	Jurisdiction	Date of Entry	Current Map	Effective
260342#	Au Train Township	06/18/87	06/18/87	
260719	Burt Township	05/25/84	none	
260343#	Village of Chatham	08/10/79	08/10/79	
260002	City of Munising	05/25/84	none	

Source: Community Status Book Report, FEMA, 2021

As of July 2013, there were no repetitive loss properties noted on FEMA's official list as being located within Alger County.

Flooding has occurred at times along the Au Train River, particularly around the Forest Lake Dam and near the mouth of the river in combination with blockages of ice or debris.

To safeguard development in high-risk erosion areas, regulations establish required setback distances from the shoreline to protect new structures. The Michigan Department of Environment, Great Lakes, and Energy (EGLE) requires special permits for construction activities within identified at-risk erosion areas. High risk erosion areas in Alger County are found in Burt Township east of Grand Marais. Floodplain areas are identified on Map 7 and high-risk erosion areas in Appendix D.

Riverine Flooding

Hazard description: A rising or overflowing of a river or creek caused by rapid snowmelt, excessive precipitation, and ice buildup.

Risk: MODERATE

Rating: 16th

There are five major watersheds and 40 sub-watersheds in the county (Map 4). Only areas along the Au Train River, Slapneck Creek, and Bohemian Creek are situated on identified floodplains. Available records do not reflect any flooding damage within the Slapneck and Bohemian floodplains. Ice jams at the mouth of the Au Train River have caused local flooding and limited property damage. Storms with heavy rainfall have caused short-term flash flooding in local creeks and waterways.

Great Lakes Flooding

Hazard description: The rising of Lake Superior caused by ice buildup, storm surges, wind or sustained high water levels.

Risk: LOW

Rating: 26th

Storms marked by heavy onshore winds can inundate shoreline areas and threaten property. Map 7 identifies high-risk erosion and floodplain areas along Lake Superior. Lake Superior water levels have been above the historic average since 2015 and hit record high levels in 2019; the current level of the lake is approximately 3 centimeters over the long-term average as of August 2021.

A seiche is an oscillation of the surface of a lake similar to a sloshing of water back and forth in a bathtub. An occurrence can last from a few minutes to several hours and is caused by water piling up on one side of the lake due to high barometric pressure or wind. When the cause abates, the bulging high water is free to head in the opposite direction. Small seiches occur on the Great Lakes every day causing water levels to rise and fall. Seiches can reach ten feet and cause major damage along shorelines. Significant historic seiches have been recorded at L'Anse, Sault Ste. Marie and Munising Bay.

In Alger County a seiche event was reported on May 30, 2011. As a dying thunderstorm complex moved over Lake Superior on the afternoon of the 30th, a seiche developed due to the wake low formed by the complex. No damage or injuries were reported from this event but water levels fluctuated by two to four feet in a matter of minutes.

A seiche in Munising Bay in July of 2014 caused the local water level to rise on the order of three feet, causing flooding and minor damage to docks on the eastern side of the bay. Another minor seiche was observed in September 2014.

A record-high wave of 28.8 feet was recorded by a monitoring buoy in the lake northeast of Munising in October 2017. These waves were caused by 100+ mile per hour winds and caused significant beach erosion. Strong storms, especially during the Fall season, can cause significant wave heights. Combined with higher-than-average water levels, the risk for significant erosion or flooding is greater. In Alger County, while the risk potential of lake flooding is real, it is considered a low to moderate hazard.

Urban Flooding

Hazard description: The rising of a body of water caused when drainage or pipe capacity is not sufficiently sized to carry away peak volume discharge.

Risk: LOW

Rating: 30th

When drainage or pipe capacity is not sufficiently sized or designed to carry away a peak volume discharge, urban flooding occurs. Urban flooding relates directly to how well drainage from impervious surfaces is controlled. Discerning a difference between riverine and urban flooding may be difficult sometimes. The most common example is ponding on roadways when water depths exceed curb heights. This has occurred along Munising Avenue in Munising. Clogged catch basins and culverts can cause flooding as well.

Urban flooding is an infrequent and temporary condition that is not considered a major hazard threat in the county.

In September of 2018, a storm dropping 3 to 5 inches of rain in a short period caused the Anna River in the city of Munising to overflow its banks, causing flooding of one to two feet in the area of Brook and Varnum Streets and in the parking lot area of the Family Fare Supermarket.

Vulnerability: Flooding, Riverine, Great Lakes, Urban Flooding

The county has an abundance of small streams, inland lakes and Lake Superior shoreline. Four local governmental units participate in the National Flood Insurance Program. No special flood hazard areas have been determined in three of the local units. Floodplain hazards have been mapped in Au Train Township and Chatham.

Some riverine flooding can be expected during the spring runoff in undeveloped areas with no property damage. Urban flooding has occurred but was short-lived and has caused little property damage. Lake Superior levels have been high in recent years, but the threat of flooding is low. Erosion did occur during high water periods in the late 1980s, and minor erosion has been noted. Erosion would be specifically accelerated in the high-risk erosion areas that have been identified in Burt Township and are included in Appendix D. Given that minor flood events have occurred rarely in Alger County over the past several years, the probability of a destructive flood is very low.

Severe Weather

Hazard description: Any of several extreme weather events occurring singly or in combination with a potential to damage property and compromise human safety.

The National Weather Service, a division of the National Oceanic and Atmospheric Administration, disseminates information by several means. NOAA weather radio is a readily available source for severe weather warnings. The Emergency Alert System replaced the Emergency Broadcast System in 1996 and is used to transmit emergency information targeted to a specific area. Terms used in weather forecasts reflect the anticipated timing and severity of an approaching storm. A “watch” is issued if a particular hazard is possible because conditions are more favorable than usual for its occurrence. Planning and preparation are the recommended courses of actions when a weather watch is issued. A “warning” indicates that a particular weather hazard either is imminent or has been reported and action to protect life and property is recommended.

Alger County receives NOAA weather broadcasts from transmitters in Munising and Grand Marais and can additionally pick up partial signals from stations in Newberry, Manistique, Escanaba, and Marquette. Under most conditions, the reception range is about 40 miles. Coverage areas are included as maps in the appendix.

The descriptions below break down individual severe weather events; however, it should be noted that severe thunderstorms are associated with damaging winds, hail, heavy rains capable of causing flash flooding, and lightning. Moreover, individual severe cold season weather events can interact to cause many hazards. The difference between rain, ice and snow can be a matter of a few degrees.

The County has experienced severe weather events in all seasons. The most damaging weather events have been caused by high winds. Appendix E describes severe weather events in Alger County from 1950 – 2020 inclusive.

The probability and damage potential of severe weather events in Alger County is high.

Tornadoes

Hazard description: An extreme weather event with the potential to damage property and compromise human safety.

Risk: LOW

Ranking: 24th

One tornado event has been reported in Alger County in the past 20 years. This was an F0 tornado that downed tree branches in Christmas in 2005.

Tornado events in the county are infrequent, with seven incidents including a funnel cloud in the past 70 years. Intensively developed areas offer the greatest potential for damage and

injury. Destruction or substantial damage to any critical facility or utility systems could affect most the county population.

Table 3.4 Tornadoes						
Timeframe	# of Events	Injuries	Casualties	Property Damage	Crop Damage	Damage Total
January 1950- December 2020 (70 years)	7	0	0	\$255 thousand	\$0	\$255 thousand

Average events/year	0.1
Average injuries/year	0.00
Average casualties/year	0.00
Estimated annual property damage (\$255 thousand / 70)	\$3,642
Estimated annual crop damage (none reported)	\$0
Estimated annual total damage (\$255 thousand / 70)	\$3,642

Hail

Hazard description: An extreme weather event with the potential to damage property and compromise human safety.

Risk: MODERATE

Ranking: 20TH

From 2000 through 2020 inclusive, 50 hail events were recorded in the county (see Appendix E, Table 1). Hail of up to 1.75 inches in size was reported on four occasions. No injuries, crop, or property damage was reported. Risks associated with hailstorms tend to be lower than those associated with thunderstorms. With the right weather conditions, hail can occur in any month though late spring and summer are the most common times of year.

In July of 1978, hail up to 3.5 inches in diameter was recorded along an 11-mile path northeast from the Chatham area to Christmas. Over 200 vehicles, many buildings, and fields of crops were damaged. Hail of this size is extremely rare but can cause significant damage or injury.

Hail is associated with thunderstorms and is generally confined to a small geographic area. All areas of the county are equally susceptible to hail events. Hail itself is seldom of a size that is dangerous to people. If large enough, hail can damage equipment, buildings, and agricultural crops.

Lightning and Thunderstorms

Hazard description: An extreme weather event with the potential to damage property and compromise human safety.

Risk: MODERATE

Ranking: 12TH

Lightning is common during summer months with passing thunderstorms. Only floods and flash floods cause more weather-related deaths. In 2006, lightning struck a tour boat for shipwreck cruises in Munising Bay. Three people were treated and released at a local hospital for minor injuries.

Areas affected by such storms range from local to regional in size. The number of thunderstorms each year ranges from 20 to 40. A moderate risk is associated with these storms for human life and property. Most lightning damage is to property - especially electronic equipment. Lightning-induced structural and forest fires represent a significant hazard. Human injuries from lightning strikes are infrequent, deaths rare. Records from 1950 through June 2013 cite a fatality in the Shingleton area in late June 1998 (see Appendix E, Table 5).

Severe Winds

Hazard description: An extreme weather event with the potential to damage property and compromise human safety.

Risk: HIGH

Ranking: 4TH

High winds frequently accompany thunderstorms. Between 2000 and 2020, 52 thunderstorm and high wind events were recorded (see Appendix E, Table 3). On average, severe straight-line winds can be expected twice a year in the Upper Peninsula. Personal property damage occurred in 21 instances over the past 20 years.

Wind zones reflect the number and strength of recorded wind events per 1,000 square miles. These designations were established for engineering design purposes (Map 9). Zone IV includes the “tornado belt” and extends as far north as Minneapolis and Green Bay. Zone III extends as far north as Menominee and southern Delta counties. The remainder of the U.P. is within Zone II and is less likely to experience a damaging wind event.

On average, severe straight-line winds can be expected several times each year. Severe wind events are likely to cause property damage and temporarily disrupt some services. Human injury is infrequent and fatalities rare.

Vulnerability (Thunderstorms, Lightning and Severe Winds)

The entire county is equally subject to thunderstorms. Damage to utility networks with service

interruptions could be expected. The impact can be direct through structural damages or it can be indirect in the form of electrical or other service interruptions.

Fifty-two severe wind/thunderstorm events and two lightning events were recorded between 2000 and 2020. No injuries or death are attributable to these events and no crop damages were reported. Property damages were almost entirely the result of a single event resulting in widespread timber damage within the Hiawatha National Forest.

Table 3.5 Severe Wind and Thunderstorm Events					
Timeframe	# of Events	Injuries	Property Damage	Crop Damage*	Damage Total*
1968-2020	69	2	\$868,500	\$2,000	\$870,500

*minus November 1998 event causing \$10 million in damage in National Forest

Average events/year (69 events in 53 years)	1.30
Average injuries/year (2 in 53)	0.03
Estimated annual property damage (\$868,500/53)	\$16,386
Estimated annual crop damage (\$2,000/53)	\$37
Estimated annual damage (\$870,500/53)	\$16,424

Snowstorms

Hazard description: *An extreme weather event with the potential to damage property and compromise human safety.*

Risk: HIGH

Ranking: 1st

Heavy snow and/or blowing snow (blizzards) events are expected each winter season in the county. The “lake effect” produces upwards of 200 inches of snow in a typical year. More than 20 inches has fallen in a single storm event. Most notable for “whiteout” conditions are open Lake Superior-exposed areas of M-28. Inconveniences - normally short-term - such as institutional and business closings or delays, treacherous driving and walking conditions with low visibility, and additional snow removal costs are all caused by snowstorms. Area schools close several times each winter due to unsafe conditions caused by snowstorms. Between 2000 and 2020 lake effect snow events occurred 52 times, and there have been nearly 150 total snow events.

Ice and Sleet

Hazard description: *An extreme weather event with the potential to damage property and compromise human safety.*

Risk: HIGH
Ranking: 2nd

Ice and sleet storm occurrences average once per year in the state. In Alger County, ice storms were recorded in January of 1999, in March and December of 2002, and February 2019. Moist warm air brings higher temperature and rainfall, often turning to snow as temperatures drop. Such systems are unstable and are sometimes accompanied with strong winds. These are very dangerous conditions. The 2002 storms affected large areas of the Upper Peninsula and caused power outages, closings and great difficulty for road crews.

Vulnerability (Snowstorms and Ice and Sleet)

Winter storms include ice and sleet storms as well as snowstorms and can be expected to occur in any year in any part of the county. Storms, or blizzards, may necessitate the closing of businesses, institutions and roadways. Power outages and other utility interruptions can affect the entire population. Property damage can occur from removal, storm-induced accidents, and heavy snow loads on structures. Widespread property damage to utility lines, trees, and light duty coverings such as awnings, canopies, and carports could be anticipated.

190 snow and ice events have been recorded since the year 2000, however, these have caused very little reported property damage and no injuries (see Appendix E). One fatality is attributed to whiteout conditions along M-28 just west of the county line in 1996. The storm events cover a regional area and damages are recorded on that basis. On average, Alger County experiences 9 heavy snow and ice events per year.

Temperature Extremes

Hazard description: An extreme weather event with the potential to damage property and compromise human safety.

Risk: HIGH
Ranking: 3rd

Above-average summertime temperatures in Alger County are normally short-lived and a low risk to human life and property. Record cold temperatures are more likely to occur and present a low to moderate risk to human life and property. Temperatures reaching minus 20 degrees Fahrenheit are common in the months of January and February. Temperatures have eclipsed 30 degrees below zero on rare occasions with windchills of -70 degrees (see Appendix E). A prolonged period of sub-zero temperatures blanketed the Upper Peninsula in the winter of 1993/94 causing water line and sewer line damage in excess of \$1 million.

Cold weather threats for humans include frostbite and hypothermia that in extreme instances can be fatal. In addition to the direct risk to humans posed by extremely cold temperatures, there are many indirect risks, including poorly insulated housing with inefficient heating systems result in an elevated structure fire danger, equipment failure, and frozen water and sewer lines.

The Wind Chill Temperature (WCT) index has been used by the NWS since 2001. It is an improved model that more accurately gauges the dangers of freezing weather and is presented in Table 3-7.

Table 3-7 Wind Chill Temperature Index											
Wind (mph)	Temperature (°F)										
Calm	35	30	25	20	15	10	5	0	-5	-10	-15
5	31	25	19	13	7	1	-5	-11	-16	-22	-28
10	27	21	15	9	3	-4	-10	-16	-22	-28	-35
15	25	19	13	6	0	-7	-13	-19	-26	-32	-39
20	24	17	11	4	-2	-9	-15	-22	-29	-35	-42
25	23	16	9	3	-4	-11	-17	-24	-31	-37	-44
30	22	15	8	1	-5	-12	-19	-26	-33	-39	-46
35	21	14	7	0	-7	-14	-21	-27	-34	-41	-48

Note: Shaded areas indicate frostbite will occur in 30 minutes or less.

Heat stroke (life threatening) and heat exhaustion are the major threats associated with high temperatures. Persons with health problems, the elderly and the very young are the most vulnerable. Damage to roadways (buckling), additional power costs for air conditioners, and discomfort for humans and animals who must work or live in such conditions are additional factors.

High temperature conditions are reported to the public using a heat index. The National Weather Service has designated three response levels based on the heat index:

- Warning - temperatures of 130° F or greater
- Watch - temperatures from 105° F to 129° F
- Advisory - temperatures from 90° F to 104° F

Temperatures in the “advisory” range can cause sunstroke, heat cramps and heat exhaustion; temperatures above 80 degrees can cause fatigue. The elderly, children and overweight people are the most vulnerable to heat stress.

Vulnerability: Since temperature extremes impact wide areas, the entire population of the county would be affected at least indirectly. Mechanical equipment, water pipes (cold weather), livestock, and heating/cooling costs would be impacted by an extreme temperature event. Casualties would be limited but property damage could be significant.

NOAA weather data from 1950 through 2020 lists only three extreme temperature events - all of which are cold weather. Although the events do not list damages or injuries, frozen water pipes and infrastructure damages were common throughout the region. Since cost and specific damage data are not available, it is not possible to determine the expected annual cost of this hazard within the county. Significant property damage can be expected with extreme temperature events, casualties would be limited.

Livestock are affected by temperature extremes. More feed is required during extremely cold weather and although cattle can endure cold, wind-driven cold presents a serious danger - especially for newborn calves. High temperatures can cause dehydration in farm animals and high humidity interferes with cooling. Less animal production is likely under these conditions.

Drought

Hazard description: A prolonged period of deficient precipitation with the potential to damage property and compromise human safety.

Risk: MODERATE

Ranking: 15TH

Droughts are primarily noted for their impact on the agricultural sector but can have many far-reaching effects. However, their risk to human life and property is low. The danger of forest fires is elevated, and trees can become stressed during periods of little or no precipitation. Recreation, navigation, waterfowl habitat, aquatic life, groundwater levels and well production can all be adversely affected during periods of drought. Private and public water supplies can be strained due to increased watering of gardens and yards. Less power generation is realized at run-of-the-river hydroelectric projects. Major droughts occur on average every 20 to 25 years and generally affect a broad area.

Drought conditions are measured using the Palmer Drought Severity Index which is published jointly by the National Oceanic and Atmospheric Administration and the U.S. Department of Agriculture. The PDSI measures the departure of water supply (in terms of precipitation and stored soil moisture) from demand (the amount of water required to recharge soil and keep water bodies at normal levels). Still, recognizing or predicting drought is very difficult.

Vulnerability: Tourism and forest production are mainstays of the county economy. Major droughts occur on an average of every 20-25 years. A drought would have an immediate and potentially long-term economic impact in all areas of the county. Elevated wildfire danger would threaten dwellings, especially in rural, forested areas. Agricultural production, which consists principally of hay and alfalfa, would be severely affected.

There are no classified drought events for Alger County recorded in NOAA weather data from 1950 through 2020. With no recorded event history within the county, determining an expected annual cost is not possible.

Earthquakes

Hazard description: A shaking, trembling, or upheaval of the earth's surface caused by volcanic action or bedrock shifting and breaking.

Risk: LOW

Ranking: 34th

The probability of an earthquake event occurring in Alger County is extremely low. Seismic hazard mapping prepared by the U.S. Geologic Survey projects the likelihood of ground motion at 2 percent in 50 years. This probability rating applies to all areas of Upper Michigan except the Keweenaw Peninsula where the projected probability is 4 percent in 50 years. Tremors have been recorded in parts of southern Michigan but are rare and with only minor damage reported. Moderate seismic activity was recorded in Menominee in 1905 and the Keweenaw in 1905, 1906 and 1909. A 1925 earthquake in Quebec was felt as far away as Whitefish Point and Newberry. An Ontario-centered earthquake was felt in Sault Ste. Marie in 1944.

Vulnerability: The U.S. Geologic Survey places the likelihood of ground motion in the entire Upper Peninsula except the Keweenaw Peninsula at 2 percent in 50 years. There have been no earthquake events recorded in the county. The risk threat is low throughout the county.

Local structures and infrastructure are not constructed to withstand a significant ground motion. An occurrence - especially if centered in Munising, would affect people and property throughout the county.

Other Environmental

Hazard description: A variety of new or newly-discovered threats to native plants, animals, and natural ecosystems.

Risk: MODERATE

Ranking: 17TH

Exotic and invasive species and diseases pose serious threats to native animal and plant life. Species that can “hide and survive” arrive from all over the world on a regular basis. If successfully established, exotics can alter species diversity by eliminating or displacing native species. Adequate control and eradication measures are very costly. The Nature Conservancy estimates that the impact of invasive species in the Great Lakes region costs more than \$200 million annually in lost revenue and prevention to United States and Canadian water users within the Great Lakes region. These are very important issues in natural resource-based Alger County and represent a moderate hazard.

Forest Infestations

There are many pathogens and insects that threaten native tree species. Each introduces some change to the forest ecosystem. Among the most prominent insect pests impacting area

forests are the pine shoot beetle, the emerald ash borer, and gypsy moth. Beech bark disease and oak wilt are among the region's most important exotic forest diseases.

Exotic Aquatic Plants

Exotic and invasive plants, such as the prolific purple loosestrife, threaten native wetland vegetation throughout the Great Lakes basin. It has no food value for wildlife. Massive beds of Eurasian watermilfoil make boating and swimming impossible and significantly change the habitat of fish and invertebrates. These are perhaps the best known of exotic aquatic plants that are affecting native ecosystems. Another, very noticeable widespread invasive species is the wetland phragmites (*phragmites australis*).

Exotic Fish, Mollusks and Crustaceans

Non-indigenous species have been increasing in numbers and populations throughout the Great Lakes and some inland waters. Shipping (ballast water) and unintentional releases are considered the major entry routes. Exotics compete with native fish stocks for food and habitat. Among the species that impact native fish populations are Eurasian ruffe, white perch, sea lamprey, common carp, and several varieties of goby. The zebra mussel, a prolific mollusk, is well established in Lake Michigan and is perhaps best known for clogging surface water supply intakes. Crustaceans such as the spiny water flea thrive on the normal food sources of juvenile fish.

Bovine Tuberculosis

Bovine TB is a lung disease that can be transmitted among animals through breathing or nose-to-nose contact. The disease has been found in cattle, goats, bison, elk, and moose. It is believed that this infectious disease is close to being eradicated in the United States. The goal of the Michigan Bovine Tuberculosis Eradication Program is to eliminate bovine TB from cattle and white-tailed deer populations. Currently within Michigan, there are two bovine TB status areas: TB Free status in the Upper Peninsula and most of the Lower Peninsula, and Modified Accredited Zone (MAZ) status in four counties of Northeastern Lower Michigan. Four beef cattle herds were diagnosed as infected with Bovine TB in northeast Lower Michigan in 2020. No cases have been verified in the U.P.

Chronic Wasting Disease

It is known that white-tailed deer, elk and mule deer can be infected with Chronic Wasting Disease (CWD). CWD is related to diseases such as scrapie in sheep, mad cow in cattle, and Creutzfeldt-Jakob (a rare and fatal neurodegenerative disease of unknown cause). There is no current evidence that the disease can infect humans or livestock. The disease is spread through saliva, urine and feces, blood and carcass parts, and infected soil.

Wisconsin has confirmed a large number of white-tailed deer with CWD. In August 2008, Michigan's first case of Chronic Wasting Disease was verified in a white-tailed deer; the three-year doe was a lifelong resident of a captive breeding facility in Kent County. In October 2018, the first case of CWD was found in Dickinson County. Parts of Dickinson and Menominee Counties, and a small portion of Delta County are currently within the Michigan DNR's U.P. Core

CWD Surveillance Area. The extent to which this disease will affect deer and other wild animals is not known. Consuming meat from infected animals is not recommended.

White-Nose Syndrome

White-nose syndrome is a disease that is new to the region that affects hibernating bats. The syndrome causes a fungal infection of the muzzle, ears, and wings of the animals. The disease has an extremely high mortality rate, over 80%, and is devastating to bat populations. The long-term impact of this disease is a decline in the bat population, which may ultimately cause insect populations to increase.

West Nile Virus (WNV)

Humans, horses, many types of birds, and some other animals are susceptible to infection through the bites of infected mosquitoes. Humans usually exhibit mild symptoms or none at all. In rare instances, infected humans can become severely ill and even die. As far as is presently known, the virus cannot be spread from human to human or from animal to human. Michigan reported the first case of WNV in 2002.

There have been 3 confirmed cases of WNV in humans in the Upper Peninsula over the last decade, with the last case in Marquette County in 2019. The CDC has recorded 1,318 WNV cases in Michigan between 1999-2019.

Eastern Equine Encephalitis (EEE)

EEE is another mosquito-borne disease that transmits from infected birds through mosquitos to mammals. In humans, the virus causes infection and swelling in the brain, with about a 30% fatality rate and survivors experiencing ongoing neurological symptoms. An outbreak in 2020 saw three human and 41 animal cases in Michigan, with one human case diagnosed in Delta County.

Lyme Disease

Lyme disease is a bacterium passed to dogs (and humans) by the bite of a deer tick. Deer ticks are quite small - about the size of a sesame seed. Portions of the northeast United States and southwestern Wisconsin are considered high-risk areas. The risk in the U.P. is considered low to moderate. Just about any outdoor activity poses some risk. In 2019, there were 276 confirmed Lyme disease cases reported in Michigan.

More than 30,000 infections are recorded in the United States annually. Evidence of infection first appears as a rash and is often difficult to detect. Infected humans will experience joint pain, nervous system, or cardiac symptoms as the disease progresses.

Vulnerability: These hazards are broad in scope and impact. In Michigan, numerous activities track and mitigate these species and diseases. This includes physician-based active surveillance systems, ecological studies, and laboratory evaluations. These hazards have a high impact on individuals but a low impact on the community as a whole. As a natural resource-based area,

Alger County would absorb an economic impact from any alteration or destruction of natural habitat and natural resources.

3.3.2 Technological Hazards

Structural fires, infrastructure failures, and fixed site or transportation-related hazardous materials releases are the most common technological hazards.

Infrastructure Failures

Hazard description: The failure of critical public or private utility infrastructure resulting in a temporary loss of essential functions and/or services.

Risk: HIGH

Ranking: 6TH

Private and public utility infrastructure is largely taken for granted except when a failure occurs. An interruption in essential utility services such as electricity, communications, transportation, storm water drainage, water, and wastewater systems can imperil life, property, economic activity, and the environment.

Dependence on telecommunication (including wireless) and electric power network sources is increasing. Routine and necessary individual, business and institutional transactions rely heavily, and sometimes exclusively, on these networks. A growing number of people pay bills, bank, and shop online.

Municipal water and wastewater systems have experienced freezing of lines. The Chatham elevated water storage tank almost froze during a period of extreme cold weather, which would have resulted in the loss of water service and fire protection to the community.

The drinking water for about 32 percent of county residents is supplied through public systems and about 30 percent are connected to public wastewater systems.

A reliable source of electricity is vital to homes, businesses, industries, and institutions. Power throughout the county is distributed by UPPCO, Wisconsin Energy, and Alger-Delta Electric Cooperative via overhead power lines. Overhead power lines are subject to weather and other events that can disrupt service. Wind, ice, lightning, falling limbs and trees, construction, and traffic accidents are the most common hazards affecting power transmission. Uprooted trees can damage underground utility lines.

Infrastructure failures can be extremely dangerous - particularly if prolonged - and represent a high hazard to humans and property within the county.

Vulnerability: Infrastructure includes those permanent structures and systems that are essential to everyday living. See Table 3.8 for a list and locations of major infrastructure in the County. To a great extent, these structures and systems are interdependent. Most critical

facilities and systems can draw temporarily from back-up power and heat sources if a service failure occurs. Most homes and businesses, however, are not equipped with reserve power and heating capabilities. Approximately 35 percent of county residents rely on public water supplies and about 31 percent use public sewer systems.

Prolonged failures of communication, electrical, gas, and other utility infrastructure would have a large impact. Certain populations such as the elderly or persons with specific medical needs are more vulnerable during prolonged communication and utility failures.

Structural Fires

Hazard description: The loss of life and property caused by a structural fire of any origin.

Risk: HIGH

Ranking: 8TH

Most structural fires are caused by human error. Citizen injuries attributable to fire occur every 43 minutes in the United States. About 75 percent of all fire fatalities happen in the home with the leading cause being unintentional or careless action.

According to statistics prepared by the National Fire Protection Association, 73 percent of residential fires occur in single or two-family dwellings. Another 20 percent occur in multi-family structures. Cooking related incidents are the leading cause of house fires, followed by those caused by heating equipment. Most residential fires originate in kitchens. Fire stops were not common to home construction before the mid-1960s. Approximately 27.4 percent of all county housing units were built before 1960.

Structural fires are a high-risk hazard to humans and property throughout the county.

Vulnerability: Structural fires occur in Alger County every year. There are many potential ignition sources, but most originate as a result of human carelessness.

There are many wooden frame older structures in the county that were constructed before the enforcement of building codes and construction inspection. Building standards are especially suspect in the case of seasonal camps and cottages, which comprise about 33 percent of the total housing units. Wood is used as the principal heating fuel in about 16 percent of all residential housing units and is commonly used in seasonally occupied housing units. Heating with wood burning devices carries an elevated fire risk that is reflected in insurance rates.

Fire prevention programs are provided in all schools. Much of this activity centers on National Fire Prevention Week each October. Most critical facilities are sprinklered and are prepared to execute evacuation plans in case of emergency. Commercial and industrial buildings must upgrade fire suppression and safety capacity to the satisfaction of their insurer.

Structural fires are most life threatening when they occur at night, as occupants are normally asleep. Where structures are close together as in the city of Munising, a conflagration is likely

as the fire spreads to surrounding buildings. At a minimum, the heat from a well-advanced structure fire will affect buildings in the near proximity. The suppression capacity of individual fire departments is enhanced by mutual aid arrangements. Response time is central to minimizing fire loss damages. Therefore, camps, cottages, homes or other structures located in remote or isolated areas are more likely to suffer extensive or total loss in a fire event. A large structure fire could result in casualties, temporary loss of utilities; shelter, clothing and food needs; disruption of the transportation network; business closures; and economic hardship including job losses.

All the fire departments in Alger County rely on volunteers. Training and volunteer strengths are issues for local volunteer departments. Some volunteer departments have difficulty maintaining force strength as a volunteer fire fighter requires a considerable time and financial commitment. Due to Alger County's large geographic size, response times are a critical factor in combatting fire instances.

Dam Failures

Hazard description: Downstream flooding caused by the collapse or failure of an impoundment.

Risk: LOW

Rating: 25TH

Extensive property and natural resource damage can result when a dam structure fails or when its capacity to hold back water is exceeded in a flood event. Maintenance and operation of dam structures are critical to public safety and property protection.

There are 23 dams and impoundments in Alger County. The Au Train Dam is rated a "high hazard" by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) with an inspection required every 3 years. The Au Train Dam is located immediately south of M-94 where it passes over the Au Train River. Dams receiving high hazard ratings are upstream of populated areas and must have emergency action plans (which include functional exercises) coordinated with the local emergency official. All other dams are rated "low hazard" by the EGLE and must be inspected every 5 years.

Dam failure is considered a low-risk hazard in the county.

Vulnerability: There are 22 low hazard dams in the county and one with a high hazard rating (Au Train). The Michigan Department of Environment, Great Lakes, and Energy determines risk designations.

Low risk dams and impoundments are found well distant from population concentrations and critical facilities. Failures would result mainly in streambank erosion and habitat disturbance with little threat to humans.

Failure of the Au Train dam would have an impact on areas along the Au Train River and Au

Train Lake and through to Lake Superior. Floodplain areas are identified on Map 7.

Nuclear Power Plant Accidents

Hazard description: An actual or potential release of radioactive material at a commercial nuclear power plant or other nuclear facility in a quantity great enough to pose a threat to the health and safety of an off-site population.

Risk: LOW

Ranking: 35TH

Nuclear power plants are strictly regulated by the federal government. Each facility must develop appropriate emergency plans. An accidental release of radioactive materials to the environment could affect public health and safety in some locations under certain weather conditions. However, the probability of a nuclear plant accident affecting Alger County is low since such facilities are of a distance that any released material would be dispersed in relatively harmless quantities. The nearest operating commercial reactors are along the Lake Michigan shoreline southeast of the city of Green Bay - a minimum distance of over 130 miles from Alger County. The likelihood of radiation contamination from a nuclear power plant accident is low.

Vulnerability: The County is isolated from the potential effects of a nuclear plant accident both in terms of distance and wind direction.

Radiation contamination from a power facility accident would affect the health of people, plants and animals. Evacuation would be necessary and could have a long-lasting impact such as rendering the area uninhabitable.

Subsidence

Hazard description: Downward movement of land surface caused by human-induced activities that have weakened or removed subsurface support.

Risk: LOW

Rating: 33RD

Most incidents of subsidence in Michigan are the result of underground mining. Other human-induced activities resulting in subsidence are groundwater withdrawal and drainage of organic soils. The dissolution of soluble materials such as limestone by groundwater can create underground cavities that weaken subsurface support enough to cause a lowering or collapse of the ground surface. There are no known instances of serious or damaging subsidence in the county.

Vulnerability: Gravel and sand mining operations are isolated and distant from population concentrations. Property damage losses due to subsidence are not likely.

Scrap Tire Fires

Hazard description: The accidental combustion of scrap tires at a designated storage area.

Risk: LOW

Rating: 32ND

Dealing with scrap tires in the waste stream is difficult and costly. Landfilling whole tires is not allowed. Wood Island Landfill in Munising Township and other licensed landfills charge to accept scrap tires according to size. Storage is limited to no more than 500 scrap tires at a site. The major concerns associated with scrap tire storage are as mosquito breeding areas and as fire hazards. At least some scrap tires are shredded and used for fuel in paper mills. This is a low-risk hazard in Alger County.

Vulnerability: There is no record of scrap tire fires in the county. Scrap tires are stored within legally allowed quantities at the Wood Island landfill until shipped to outside markets for recycling or final disposal. Automotive service facilities and salvage areas have quantities of tires that could create a large volume of acrid smoke. Facilities with quantities of scrap tires are fairly well isolated from population concentrations. If such a fire occurred, some evacuation would likely be required.

Hazardous Materials Incidents

Hazardous materials in quantities of concern are common in most communities. If released, a risk to life, health, environment, and property is possible because of the chemical, physical, or biological nature of the material. Regulatory measures apply to the manufacture, transport, storage, use, disposal, and accidental release of hazardous materials.

Hazardous Materials - Fixed Site

Hazard description: An uncontrolled release of hazardous materials from a fixed site capable of posing a risk to life, health, safety, property, or the environment.

Risk: MODERATE

Ranking: 23RD

Those facilities having threshold quantities of extremely hazardous substances (EHS) on site are subject to reporting requirements set forth under federal statute (SARA Title III, Section 302). There is currently one such facility in the county. Smaller quantities of hazardous materials are commonplace and include corrosive and incendiary products such as agricultural chemicals, cleaning agents, solvents, etc.

Several methamphetamine labs and dump sites have been discovered in Alger County in the past several years. The product and its production process are extremely hazardous and can lead to the condemnation of structures. The Upper Peninsula Substance Enforcement Team (UPSET) is a multi-jurisdictional task force that investigates and responds to meth lab and dump sites.

Accidents resulting in fires or explosions at industrial facilities can cause a release of harmful substances. Flooding and severe weather can cause an unintended release as well. With few industrial or other sites where there exists a significant release potential, the risk potential of this hazard is considered low in Alger County.

Vulnerability: There is only one SARA Title III, Section 302 site in the county, the Neenah Papers paper mill in Munising. There are numerous propane gas outlets, auto part stores, hardware stores and similar facilities that store hazardous material in non-reportable quantities. These sites where threshold amounts are stored for short periods are therefore exempt from reporting requirements. A release in or nearby populated areas could interrupt essential services, the transportation network, and overload emergency and medical capacities.

Hazardous Materials - Transportation

Hazard description: An uncontrolled release of hazardous materials or substances during air, land, or water transport.

Risk: MODERATE

Ranking: 19TH

Surface transportation accidents include road, rail, and water. While such transportation is reasonably safe, accidents inevitably occur in any of many forms. Existing roadways are becoming more crowded with increasing traffic volumes, a situation that increases accident probabilities.

Federal regulations concerning the transport of hazardous materials have been incorporated into state law thereby making it compulsory for both interstate and intrastate transportation. Employers are responsible to train, test and certify all employees involved with the shipping or transporting of hazardous materials. All shipments must list product name, hazard class and emergency information on a manifest. Special permits are required for the transport of medical waste and hazardous waste (EGLE) and, depending on quantity, U.S. Department of Transportation registration is necessary to transport hazardous material. Placarded vehicles are required to stop at railroad crossings; escorts are required at both the Mackinac and Ambassador bridges in Michigan.

Hazardous materials being transported bear one of ten classification placards. It is likely that all pass through the county at some time, but records are not available. A brief description of each class follows:

- Class 1 represents explosives which are further classified according to sensitivity, projection and fire hazard characteristics.
- Class 2 includes gases further defined as flammable, non-flammable and compression, and poisonous.
- Class 3 includes flammable and combustible liquids.
- Class 4 includes flammable solids further defined as flammable solids, spontaneously combustible material, and those that become dangerous if wetted.
- Class 5 includes oxidizers and organic peroxides further defined into subcategories.
- Class 6 represents poisons and may be poisons or infectious substances.
- Class 7 represents radioactive material.
- Class 8 includes corrosives.

- Class 9 involves miscellaneous materials not included in other classes.
- ORM-D (other regulated material) has a limited hazard potential because of its form, quantity, or packaging; usually these are consumer commodities.

Road

State trunklines M-28, M-94, M-67 and US-41 are all common routes for tanker truck traffic. A majority of county residents live along or close to these trunklines. Commercial trucks sometimes carry multiple types of hazardous material in a single transport. Placards are required only for those materials of a reportable quantity. In the case of an accident, first responders would likely not have knowledge of all hazards involved.

Proper maintenance, loading and operation of commercial vehicles are critical. Heavy trucks use air brakes exclusively and generate drum temperatures to 600 degrees F. Uneven loads or a faulty brake system can push drum temperatures as high as 1,000 degrees, which is extremely dangerous. Tankers less than three-fourths full are considered dangerous due to instability caused by “sloshing”. Diesel fuel is hard to ignite, but the volume carried aboard large trucks can cause a big problem if ignition does occur.

In 2020, MDOT reported that just over half of the 266 motor vehicle crashes in Alger County occurred on State or US Routes. 13 of those crashes involved a large truck or bus, and none of those vehicles were carrying hazardous materials.

Water

Pleasure craft and commercial vessels are common on Lake Superior. Cargo (coal) offloaded at Munising averages about 50,000 tons annually. Munising Bay affords a navigable channel depth of 24 feet and is one of 38 commercial ports in Michigan.

Sand, stone, iron ore, coal and cement make up about 95 percent of Great Lakes cargo tonnage; petroleum and chemical products represent about 3 percent of the total tonnage.

Air

Air transportation accidents are rare. Small private aircraft use the turf surfaces of Hanley Field and Burt Township Airport.

Rail

Nationwide, there were 25 train accidents in 2012 that resulted in the release of hazardous materials, forcing more than 2,000 persons to evacuate. There have been no records of train-related hazmat release incidents in Alger County in the past decade.

The Federal Railroad Administration (FRA) reported there were an average of 2.59 accidents per million train miles in the United States over the past 10 years. Derailments accounted for 57 percent of the accidents. The most common accident cause is attributable to human action (46 percent); 34 percent of the accidents resulted from track defects. 3 percent of the accidents were caused by signal defects. Nationwide, there have been 155 train accidents between 2012-2021 that resulted in the release of hazardous materials.

Statistics from the FRA report almost 19,656 incidents at highway-rail crossings between 2012-2021. These incidents resulted in 2,300 fatalities. The FRA reports that highway-rail and trespassing incidents account for 95% of all fatalities.

The Canadian National Railroad, Wisconsin Central Division, provides rail service, with 28 rail crossings throughout Alger County. Less than 50 train cars carrying hazardous material pass through the county each year on average.

It is likely a variety of hazardous materials move through the county every day. A moderate risk to humans and property exists along and near transportation routes.

Vulnerability: The transport of hazardous materials to and through the county is limited to surface modes - primarily roadway. A potential for an accidental release is ever-present. A major incident in a populated area could overload emergency and medical capacities as well as disrupt utility services.

Pipeline Failures

Hazard description: An uncontrolled release of product(s) from pressurized pipelines lying above or below the ground.

Risk: MODERATE

Rating: 21ST

Leaks or eruptions from natural gas or petroleum pipelines can have very serious consequences in a community including injuries and loss of life, environmental degradation, and economic hardship. Pipeline accidents are largely the result of excavation not related to operation and maintenance of the pipeline itself.

Two natural gas pipelines enter the county from the west and south, and roughly run parallel to M-94 and M-67, respectively. These meet at a pumping station south of Eben Junction, then continue as one line northeast to Au Train, Christmas, and Munising.

Vulnerability: Three segments of natural gas pipeline run through Alger County and follow trunkline routes to supply several communities. Though there have been no reported accidents, a rupture or explosion could result in casualties, infrastructure damage, transportation interruptions (rail and roadway), local road closures and select area evacuations.

3.3.3 Social

The hazards associated with human behavior cannot be predicted with scientific certainty, or even in terms of probabilities. However, past events document that unruly human actions happen in many forms and under a variety of circumstances. The potential for loss of life and property is not less serious with hazards of this type.

Civil Disturbance

Hazard description: A public demonstration, gathering, or prison uprising that results in a disruption of essential services and is characterized by unruly or unlawful behavior.

Risk: LOW

Rating: 27TH

Noteworthy instances of civil unrest in the county are absent from the historical record. However, a single action can trigger such conduct.

Michigan operates 28 active correctional facilities. Prisons security levels range from Level V (highest) to Level I (easily managed prisoners). A large prisoner population is found in Alger County. Alger Correctional Facility in Munising Township is a 932-bed Level IV and II prison that houses all males. The 52-bed Alger County Jail houses both male and female prisoners. Sentences for less serious crimes or first-time offenders may be served in halfway houses or through home confinement monitored electronically.

Labor disputes and work stoppages - especially if prolonged - are highly emotional and can result in violent behavior.

Public meetings or proceedings dealing with controversial issues carry an elevated risk of unruly behavior. This includes meetings at every level of government and places where decisions affecting individuals are rendered such as courtrooms and regulatory/compliance agencies.

Demonstrations for or against something are usually peaceful but can transform to unruly quickly under certain circumstances. Celebrations are generally associated with some special accomplishment that joins people together. Normally celebrations are peaceful and fun for the participants but can get out of hand - particularly if the partying involves alcohol consumption.

A low-risk potential is associated with such events.

Vulnerability: While no such incidents are found in the historical record, a single highly emotional issue can quickly trigger a disturbance. The population base of the county is stable but the demographics are changing as it ages quite rapidly. Alger Correctional Facility poses the greatest potential for a major civil disturbance. If an event of this type were to occur, it would be limited to a specific area and involve a small percentage of the population.

Terrorism, Sabotage and Weapons of Mass Destruction (WMD)

Hazard description: Intentional, unlawful and subversive action(s) against persons and property to further political, social or religious objectives through intimidation and coercion.

Risk: LOW

Rating: 31ST

Until the attacks of September 11, 2001, acts of terrorism were associated almost exclusively with other parts of the world. Besides injuring and killing people and destroying property, such acts are intended to instill fear and uncertainty on the targeted population. Places that attract large numbers of people may be the targets of choice for terrorists. The introduction of contaminants to food and water sources is another means of affecting large numbers of people. Weapons could be nuclear, chemical, biological, or informational. Motives could be racial, ethnic, religious, environmental, or political. Weapons and motives vary but the themes of fear and hate always apply.

A major terrorist action in an urbanized area could trigger an influx of people into the county in search of safety and quiet. A large and rapid population convergence on the county could strain local resources, possibly to a dangerous level.

Vulnerability: Aside from prank bomb threats at local schools, there is no record of terrorist acts in the county.

Places where large numbers of people congregate or are housed such as schools, churches, nursing homes and the hospital would be most affected by an act of terrorism although the means and location of an action could impact any area of the county. Casualties and property damage potential is significant.

Remote location, sparse population, and the absence of high visibility targets of strategic importance suggest a low-risk potential in Alger County.

Bioterrorism

Hazard Description: Terrorism involving the release of toxic agents.

Risk: LOW

Rating: 29TH

Bioterrorism can be overt or covert and involve the dispersion of disease pathogens. Germ warfare is very difficult to defend against and places new and demanding responsibilities on the public health system and primary healthcare providers. Anthrax (*Bacillus anthracis*), botulism (*Clostridium botulinum* toxin), plague (*Yersinia pestis*), smallpox (*variola major*), tularemia (*Francisella tularensis*), and viral hemorrhagic fevers (ebola and others) are the highest priority agents (Category A).

Category A diseases/agents have the following characteristics:

- easily transmitted from person to person
- high mortality rates and potential for major impact
- potential to incite public panic
- require special preparedness measures

Category B diseases/agents are less easily spread and less likely to cause illness or death. These include the poison ricin, bacterial food and water safety threats, and many others.

Third highest priority diseases/agents (Category C) include emerging infectious threats from pathogens such as hantavirus. Category C agents are considered easy to produce and introduce, as well as highly effective in causing illness and death.

Based on what is known and local factors, a low-risk potential is indicated.

Vulnerability: While no acts of bioterrorism have occurred in the county, a large percentage of the population could be affected if an agent was introduced where large numbers of people congregate or through public water supplies. High casualties and elevated community anxiety would be likely.

Public Assembly Events

Hazard description: *Publicized congregations of people, admitted with or without fee, and held for entertainment, enrichment, socialization or education purposes.*

Risk: MODERATE

Rating: 13TH

Public gatherings are usually planned and involve civic, cultural, religious, sporting or other community events. The movement of people to, from and within such events can temporarily overload ingress, egress and control capacities and create a hazardous situation (discussed in 2.0).

Large assembly events occur year-round and are listed in Table 3.7. The risk potential with these events is moderate.

Table 3.7 Large Annual Public Assembly Events, Alger County			
Name	Location	Date of Event	Estimated Attendance
U.P 200 Sled Dog Race	Chatham	mid-February weekend	1,000

Table 3.7 Large Annual Public Assembly Events, Alger County			
Name	Location	Date of Event	Estimated Attendance
Trenary Outhouse Classic	Trenary	weekend following U.P. 200	3,000
Munising all-class reunion	Munising	weekend preceding July 4 th	1,000
Fourth of July parade and fireworks	Munising	July 4	2,000
Hiawatha Music Festival	Grand Marais	second week in August	5,000
Alger County Fair	Chatham	August	2,000
Chatham Homecoming	Chatham	August (coincides w/fair)	2,000
School sporting, musical, theatrical, graduation and extra-curricular events	Countywide	all months	varied
Kewadin Casino	Christmas	all months	capacity

Vulnerability: Numerous large public gatherings are held throughout the year. Most are family-type events that attract people of all ages. Events are held in several communities throughout the county. Law enforcement activity is at a level ordinarily expected with such events. Vulnerability is present in any such situation with large crowds and heavy traffic.

School Violence

Hazard description: *Rowdy, threatening, unlawful, or otherwise aberrant behavior within educational facilities.*

Risk: MODERATE

Rating: 22nd

The reported incidents of serious school violence over the past decade have increased. Multiple shooting incidents at various school locations around the nation have resulted in the implementation of new security and preventative measures. According to studies, students who feel they have been bullied, threatened, injured, or otherwise treated badly are the most likely to carry out serious acts of violence.

A series of bomb threats at the Munising High School and Mather Middle School commanded

intensive police investigations. Early and day-long school closures were necessary as buildings were swept by law enforcement personnel and specially trained dogs when available. Another bomb threat occurred at Munising High School in 2012, which resulted in a two-hour school closure while police investigated. These incidents were false reports and perpetrators were identified and charged.

The risk potential is low.

Vulnerability: There is no record of serious violence occurring in area schools. While an elevated concern exists in view of tragic national events and cultural changes, violence constituting criminal action has not been experienced.

School violence events could affect one or several persons. Property damage would be limited to school structures and equipment.

Workplace Violence

Hazard description: Rowdy, threatening, unlawful, or otherwise aberrant behavior within places of employment.

Risk: LOW

Rating: 28TH

Workplace violence is a serious and deadly hazard. Incidents of assaults or threats to employees or supervisory personnel by discharged, disgruntled, or otherwise emotionally unbalanced employees seem to be on the rise. Many things including racial differences, lifestyle preferences and romantic involvements can trigger incidents. Tragic incidents of workplace violence have spawned a variety of resources aimed at early interdiction to underlying causes.

Incidents of workplace violence in the county consist of threats and harassment, and much of the information is anecdotal only.

A low-risk potential is indicated.

Vulnerability: Incidents of workplace violence within Alger County are not found in the public record.

The population of the county is aging rapidly with significant in-migration of retirees. There are only a few large employing entities. Citizens, for the most part, interact with one another and know their co-workers and neighbors. An incident would affect the victim(s) and have little impact on property.

Public Health Emergencies

Hazard description: Incidents of contamination or epidemic that present a clear danger to the general health and well-being of the public.

Risk: HIGH
Rating: 7TH

Disease, epidemics, pandemics, contaminated water supplies, instances of food poisoning, and chemical, biological or radiological exposures are among the many potential causes of a public health emergency. Public health emergencies can occur as the result of a primary disaster such as a severe storm, flooding, or release of hazardous material. Normally such occurrences are confined within a locality. However, widespread impact is possible with contagious diseases.

Food processing provides multiple opportunities for contamination through accidental or intentional action. Food service workers are required to report specific illnesses and may not work if afflicted with certain contagious diseases. To safeguard diners, licensed kitchens must designate a “person-in-charge” to oversee food preparation. High employee turnover in the food service industry makes it difficult to ensure that proper training has been completed. Public health officials inspect sanitary conditions at food establishments regularly.

Exposure to certain types of hazardous material may require special decontamination measures before transporting the victim to a medical clinic or hospital. Identification of the contaminant is necessary. Typically, first responders - many of whom are volunteers - need extensive identification and appropriate contamination procedure training. Transportation capacity is limited to the number of rescue vehicles within the county.

The West Nile virus (discussed in Section 3.3.1) is spread by mosquito bites and can cause encephalitis or meningitis. An incubation period is from 3 to 15 days, and many people exhibit no symptoms before fully recovering.

County health officials monitor public water supplies. Private wells are sampled when new, to comply with loan requirements, or as deemed necessary by the owner. Wells not properly grouted are more susceptible to contamination - especially in areas where limestone bedrock and little overburden are present.

New and emerging public health issues suggest a moderate potential for harm. The current COVID-19 pandemic is one such event and is ongoing. Coordination between local agencies and supply chain stresses were significant challenges that have resulted in new avenues of communication.

Vulnerability: Virtually the entire county population is susceptible to disease or epidemic. A greater concern exists for elderly and very young children. A major outbreak would stress existing medical capacities. The concern about property would be with contamination that might result in special decontamination measures, if possible, or destruction. The COVID-19 pandemic strained county resources through mitigation and response efforts from different agencies. Through the pandemic, local agencies learned to coordinate response and tracking, and may be better prepared for a future occurrence.

Economic Recession/Adversity

Hazard description: A situation characterized by business downturns and closings and severe labor force reductions.

Risk: MODERATE

Rating: 18TH

Employment base losses due to closure or relocation and serious business downturns - especially if prolonged - can cause tremendous hardship and pressure on a community and its people. Desperation can lead to uncharacteristic and destructive behavior. An area is likely to experience population losses during hard times as people move to areas with better employment prospects. As disposable personal income dwindles, local businesses will find it more difficult to remain in operation. Moreover, as private and public investment wanes, the physical condition of structures and infrastructure will likely degrade.

In 2008 an economic bubble in the value of housing burst, leading to a large recession, from which it took several years to recover. Economic losses due to the Coronavirus Pandemic have yet to be fully realized.

The last severe and prolonged economic period was the Great Depression which began in the late 1920s. With lifestyle changes, technology, and a plethora of assistance programs, it is unlikely that those extreme difficulties will be repeated. In addition to the 11.2 percent of county residents whose incomes fall within government poverty standards, there are many individuals and families that are perilously close to the poverty level.

Most any type of disaster can destroy businesses. Unfortunately, most businesses store vital records on-site. If forced to close due to a disaster, about half will not reopen.

Economic issues have a broad effect. A moderate risk potential is associated with this hazard.

Vulnerability: A prolonged economic slump, closure of a major employer, or a collapse of the financial market would impact nearly all persons living in the county. A decrease in property values, business, employment, and investment would occur commensurately with the severity of the economic situation. A corresponding increase for services could be expected that would exceed local capacities.

Transportation Accidents

Hazard description: Unintended events associated with any mode of transportation that brings harm to people and property.

Risk: MODERATE
Rating: 9TH

Surface transportation accidents include road, rail, and water. While such transportation is reasonably safe, accidents inevitably occur in any of many forms. Existing roadways are becoming more crowded with increasing traffic volumes, a situation that increases accident probabilities.

Road

Most vehicular accidents occur between 6:00 a.m. and 6:00 p.m. Accidents increase during busy traffic times such as those associated with start and dismissal times of schools, industries and businesses. Further, the crash, injury and death rate is highest along county and city roads. A 5-year ranking (2015-2019) of Michigan's 83 counties by the number of injuries and deaths puts Alger at 51st overall.

In 2020 there were 266 crashes in Alger County. Two accidents were fatal and 61 resulted in injury. Passenger cars accounted for 71.8 percent of the total vehicles in crashes.

School buses and county transit buses carry many passengers and make frequent stops and turns along busy roadways.

Manifestations of anger on the nation's roadways in recent years have been widely reported. Incidents of "road rage" have resulted in injuries and fatalities. Behavior of this sort reflects a lack of consideration for the safety of others, and also an unwillingness or inability to control emotions. Statistically, drivers between the ages of 25-34 are involved in the most fatal accidents.

Water

Between 40,000 and 50,000 tons of coal is offloaded at the Neenah Papers paper mill annually. Munising affords a natural deep-draft harbor (24') and is among 38 Michigan ports that are regularly used for commercial cargoes. Commercial tourist and fishing boats are common to Munising Bay, plus smaller pleasure craft.

Air

Air transportation accidents are rare. Air traffic at Hanley Field and Burt Township Airport is light, generated by small, private aircraft. Both airports have turf runways.

Rail

Rail service is provided by the Canadian National Railroad. Munising is the terminus of the railroad's line from the east with Neenah Papers being their major customer. Latex and baled pulp make up most of the rail freight. A rail siding in Shingleton serves the Timber Products facility.

The Federal Railroad Administration (FRA) reported there were an average of 2.59 accidents per million train miles in the United States over the past 10 years. Derailments accounted for 57 percent of the accidents. The most common accident cause is attributable to human action (46 percent); 34 percent of the accidents resulted from track defects. 3 percent of the accidents were caused by signal defects.

Statistics from the FRA report almost 19,656 incidents at highway-rail crossings between 2012-2021. These incidents resulted in 2,300 fatalities. The FRA reports that highway-rail and trespassing incidents account for 95% of all fatalities.

Recreational

Recreational transportation by means such as boats (power and sail), snowmobile, off-road vehicle, and road and mountain bikes result in injuries and deaths each year. Fourteen snowmobiles and seven off-road vehicles were involved in crashes in Alger County in 2020. Generally, the consequences of such accidents are limited to the user(s) and their recreational apparatus.

Currently, snowmobiles are allowed to operate on county roads. Road officials are concerned that safety hazards associated with snowmobiles using public roadways, damage to those roads, and general liability exposure may necessitate a policy change. Safety issues have generated many complaints to local law enforcement - especially in residential areas such as Grand Marais and Munising.

Transportation accidents occur almost daily with an impact limited primarily to those involved. The hazard potential is moderate.

Vulnerability: Transportation accidents can be expected on any day in any part of the county. Typically, accidents are not serious and involve limited property damage and perhaps minor injuries. Trunkline intersections and access points present the greatest potential for serious accidents due to speeds and traffic volume. Accidents can result in traffic re-routing, disruption of utility services and place a considerable demand on law enforcement and emergency and hospital resources.

3.4 Identified Hazards with Affected/Vulnerable Facilities

Throughout Alger County, there are a number of critical services/facilities that are potentially vulnerable or at risk to be affected by identified hazards. Data presented in Table 3.8 below identifies both the number of such facilities and the names of the facilities. Table 3.9 shows which facilities/services are potentially at risk by each identified hazard for the county.

Table 3.8		
Alger County Facilities		
Alger County Critical Facilities		
1 Hospital	Munising Memorial	1500 Sand Point Rd., Munising
3 Medical Clinics	Trenary Medical Center	E2995 M-67, Trenary
	Sandee Sibbald Medical Center	Burt Twp. Hall, P.O. Box 51, Grand Marais
	Sault Ste. Marie Tribe Health Division	Grand Island Chippewa Community Center, 622 W. Superior, Munising
1 Health Department	LMAS Health Department	E9526 Prospect Street, Munising
13 Police/Fire Departments	Au Train Township VFD	N7577 N. Spruce St., Box 33, Au Train
	Burt Township VFD	21788 E. Coast Guard Point Rd., Grand Marais
	Mathias Township VFD	E2409 First Ave. S., Trenary
	Munising Township VFD	101 E. Varnum St., Munising
	Onota Township VFD	E1461 Deerton Sand Lake Rd., Deerton
	Rock River VFD	E3667 M-94, Chatham
	Munising VFD	100 E. Munising Ave., Munising
	Tri-County FD	N384 FFH13, Wetmore
	Munising City Police	411 Mill St., Munising
	Alger County Sheriff Department	101 E. Varnum St., Munising
1 Ambulance Service	Alger County Sheriff Department	101 E. Varnum St., Munising
1 Solid Waste Facility	Wood Island Landfill	1008 M-28, Wetmore
2 Prison/ Jail Facilities	Alger Correctional Facility	N6141 Industrial Park Dr., Munising
	Alger County Jail	101 Court St., Munising
Alger County Public Infrastructure		
4 Municipal Water Systems	Munising	560 E. Munising Ave., Munising
	Chatham	
	Trenary	
	Grand Marais	E21788 Coast Guard Point Rd., Grand Marais
2 Municipal Wastewater Systems	Chatham	
	Munising	560 E. Munising Ave., Munising
3 Electrical Service Providers	Alger Delta Cooperative Electric	426 N. 9 th St., Gladstone
	U.P. Power Company	600 E. Lakeshore Dr., Houghton
	Wisconsin Energies	231 W. Michigan St., Milwaukee, WI
1 Natural Gas Provider	DTE	1 Energy Plaza, Detroit
2 Public Airports	Grand Marais	Grand Marais Airport – Y98, N12898 Seney Rd., Seney
	Munising	Hanley Field Airport-5Y7, County Hwy 660, Munising
2 Public Harbors	Munising City Dock & Marina	100 W. Munising, Munising
	Grand Marais Harbor	Grand Marais

Table 3.8		
Alger County Facilities		
1 Rail Carrier	Canadian National Railroad	935 ed la Gauchetiere St. W., Montreal, Quebec, Canada
2 Telephone Service Providers	Hiawatha Telephone Company	108 W. Superior St., Munising
	TDS Telecom	E3708 Marquette St., Chatham
Cell Phone Service Providers	AT & T	2172 US-41 W., Marquette
	Verizon	1021 W. Washington St., Marquette
Internet Service Providers	Charter Communications	359 US-41 E., Negaunee
	TDS Telecom	E3708 Marquette St., Chatham
	Jamadots	108 W. Superior St., Munising
Alger County Education Facilities		
6 Public School Buildings	Munising Middle & High School	810 M-28, West Munising
	Mather Elementary School	411 Elm Ave., Munising
	Central Elementary School	124 E. Chocoday St., Munising
	Burt Township School	27 Colwell Ave., Grand Marais
	Superior Central School	E2865 State Rd. 94, Eben Junction
	Au Train-Onata Elementary School	8790 Deerton Rd.
2 Private School Buildings	Munising Baptist School	N6285 Connors Rd., P.O. Box 339, Wetmore
	Seventh-Day Adventist Elementary School	E8799 M-28 W., Munising
2 Head Start Centers	Traunik Head Start Center	E2866 H44 Rd., Traunik
	Munising Head Start	N7278 Woodale Rd., Munising
Extremely Hazardous Materials (302 Sites)		
1 Hazardous Site	Neenah Paper Mill	501 E. Munising Ave., Munising

Table 3.9	
Identified Hazards and Vulnerable Facilities	
Identified Hazard	Affected/Vulnerable Facilities & Infrastructures
Ice & Sleet Storms	Telephone service providers, educational facilities
Temperature Extremes	Water systems, wastewater systems
Snowstorms	Hospital, medical clinics, health department, police/fire departments, ambulance service, educational facilities
Drought	Water systems
Severe Wind	Electrical service providers, telephone service providers
Wildfires	None
Tornadoes	All facilities and infrastructures
Lightning & Thunderstorms	Electrical service providers, telephone

Table 3.9 Identified Hazards and Vulnerable Facilities	
Identified Hazard	Affected/Vulnerable Facilities & Infrastructures
	service providers
Subsidence	All facilities and infrastructure
Hail	All buildings and facilities
Flooding	Water systems, wastewater systems, government buildings, bridges, roadways, railroads.

3.5 Declared Disasters in Alger County

There have been four declared disasters in Alger County as shown in Table 3.10.

Table 3.10 Declared Disasters in Alger County (as of August 2013)			
Disaster Number	Declaration Date	Incident Type	Description
3035	3/2/1977	Drought	Drought
3057	1/27/1978	Snow	Blizzards & Snowstorms
3225	9/7/2005	Hurricane	Hurricane Katrina Evacuation*
4494	3/27/2020	Biological	COVID-19 Pandemic (ongoing)

*Refers to the federal disaster aid that was made available to Michigan to supplement its efforts to assist evacuees from areas struck by Hurricane Katrina. Source: FEMA Declared Disasters, <http://www.fema.gov/disasters>

4.0 Identify and Prioritize Strategies

The Hazard Analysis results outlined in Chapter 3 helped guide meetings with the Local Emergency Planning Committee (LEPC) in Alger County that produced the specific issues, goals, and strategies in this chapter. Using the Hazard Analysis results as guidance and qualitative analysis, the LEPC selected the issues and complementary mitigation strategies in 4.1 as priorities for Alger County.

For the 2021 Hazard Mitigation Plan revision, the LEPC revisited the issues and strategies. Some new strategies were added in order to improve the community's ability to mitigate hazards. These new strategies are ranked separately (see 4.3) in order to distinguish between the original strategies and those added in the update.

4.1 Issues, Goals, and Strategies

4.1.1 Severe Weather

Issue(s): Severe winter weather (snowstorms, ice and sleet, extreme cold) and weather associated with thunderstorms (high winds, hail, lightning) are seasonal hazards in Alger County. NOAA weather radio coverage in the eastern portion of the county is unreliable. Winter whiteout driving conditions occur on M-28 along the Lake Superior coastline.

Goal: Improve the capacity of Alger County to respond to and prepare for severe weather-related incidents.

Strategies:

- Increase weather tower coverage and use of NOAA Weather Radio.
- Maintain and improve/expand emergency warning systems in communities across the County.
- Educate the public about the emergency warning systems available in Alger County.
- Collaborate with local agencies to correct shelter weaknesses by updating equipment, providing adequate generators, and establishing new shelters for vulnerable populations.
- Utilize snow fences or living fences to limit the blowing and drifting of snow over critical roadway segments.
- Update or expand public education efforts for emergency preparedness.

- Provide generators for use at municipal fuel pumping facilities and designated gas stations.
- Seek funding from public and private sources to install community warning sirens.
- Provide emergency generators for use at medical and school facilities.
- Bury/protect power and utility lines in critical locations.
- Insulate public infrastructure, such as water lines, sewer lines and water storage tanks, from cold weather conditions

4.1.2 Structural Fires

Issue(s): There are 6,691 housing units in the county (3,007 occupied), with 27.4 percent constructed before 1960; fire stops are not common to pre-1960 homes. Building codes generally require public buildings and businesses over 12,000 square feet to have sprinkler systems.

Goal: Reduce the County's losses from structural fires.

Strategies:

- Install or upgrade sprinkler systems in commercial, industrial and large residential use buildings.
- Ensure fire departments and other responders have adequate equipment and training to respond to structural and commercial fires.
- Update site emergency plans for schools, factories, office buildings and other appropriate sites.
- Continue county-wide fire training events and programs.
- Institute regular inspections of commercial, industrial, multi-family residential use buildings, day care facilities, churches, and other buildings where large groups of people congregate.
- Seek additional funding for equipment and training opportunities for volunteer fire departments throughout the county.

4.1.3 Wildfires

Issue(s): With an increasing number of permanent and seasonal dwellings being built in wildland areas there is a greater potential for life and property loss. Private roads may not be constructed to permit adequate access by emergency vehicles. The threat of wildfires increases in the summer; weather is a critical factor.

Goal: Reduce the potential loss of life and property from wildfire in Alger County.

Strategies:

- Educate the public, home, and property owners about wildfire safety. Partner with Forest Service to educate tourists using camping facilities.
- Identify natural fire breaks (power line and pipeline ROWs, railroad grades, streams and rivers, etc.) across the landscape of the county where wildfires might be intercepted and contained.
- Create firebreaks in high-risk forest areas.
- Create a “defensible space” around individual property in high-risk forest areas.
- Provide adequate property access for emergency vehicles and fire equipment.
- Use fire resistant building materials in high-risk wildfire areas.
- Identify escape and entry routes in areas with high wildfire risk.
- Ensure fire departments have adequate equipment and training to respond to wildfires.

4.1.4 Public Health

Issue(s): A public health or bioterrorism event in Alger County would affect large portions of the population and cause high casualties. Medical, public health, and other agencies are not fully prepared for this type of event.

Goal: Increase the County’s capability to prepare and respond to public health emergencies.

Strategies:

- Implement and continue to provide countywide training and equipment to respond to a public health emergency.

- Develop a database and keep current a listing of volunteers that can assist during a major public health event.
- Provide back-up generators for water and wastewater treatment facilities, the county airport, and the county jail to maintain acceptable operating levels during power failures.
- Increase public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies.
- Develop and continue to update existing plans to cover possible public health emergency events.
- Explore the establishment and implementation of a “reverse 911” calling system.
- Maintain and develop increased partnership opportunities to coordinate with Luce Mackinac Alger Schoolcraft (LMAS) District Health Department on issues related to public health.

4.2 Evaluation Criteria

The CUPPAD Regional Commission in cooperation with the Alger County Local Emergency Planning Committee (LEPC) devised criteria to evaluate the proposed strategies. The criteria introduces a system of points for strategies that affect large or small groups of people, recurring hazards, property damage, cost effectiveness, and natural resources.

The LEPC used the evaluation criteria to weight mitigation strategies for the issues listed in table 4.1. Larger point values were given to strategies that: affect large groups of people, mitigate recurring hazards, attempt to reduce property damage countywide, are cost effective to implement and use local resources. The final scores are displayed in Table 4.2 (strategies from the 2007 process), Table 4.3 (strategies from the 2013-2015 process), and Table 4.4 (2021 process).

Table 4.1		
	Evaluation Criteria	Points
A	The project/alternative protects the health, safety, and general welfare of the greatest number of residents (countywide, at least ½ the population, less than ½ the population).	25 - 15 - 5
B	The project/alternative mitigates a recurring problem.	20
C	The project/alternative is intended to reduce property damage to structures community wide.	15

Table 4.1		
	Evaluation Criteria	Points
D	The project/alternative is intended to reduce property damage to selected areas of a community.	10
E	The project/alternative is cost effective for the community.	25
F	The project/alternative can be implemented using only local resources (100% local resources, less than 100%)	10 - 5
G	The project/alternative is intended to protect the area's natural resources. (forests, surface water, etc.)	5

4.3 Mitigation Strategies

Below are the results of using the evaluation criteria in 4.2 to weight the hazard mitigation strategies discussed in Section 4.1 - Issues, Goals, and Strategies.

Table 4.2	
Strategies by Rank Score (2007)	Points
Public education on emergency warning systems	95
Provide generators for use at municipal fuel pumping facilities	95
Participate in the "Firewise Communities" Wildfire Protection Program	95
Educate the public about wildfire safety	95
Update and/or expand public education efforts for emergency preparedness	90
Insure fire departments and other first responders have adequate equipment and training to respond to structural and commercial fires	90
Increased weather tower coverage and use of NOAA Weather Radio	85
Update site emergency plans for schools, factories, office buildings, and other appropriate sites	80
Develop a database of volunteers that can assist during a major event (public health emergency, etc.)	80
Create firebreaks in high-risk forest areas	80
Utilize snow fences or living snow fences to limit blowing and drifting snow over critical roadway segments	75
Countywide training and equipment to respond to a public health emergency	75
Develop and continue to update existing plans to cover possible public health emergency events	75

Table 4.2	
Strategies by Rank Score (2007)	Points
Create a “defensible space” around individual property in high-risk forest areas	75
Provide adequate property access for vehicles and fire equipment	75
Correct shelter weaknesses by updating equipment, providing adequate generators, and establishing shelters for vulnerable populations	70
Sprinkler system installation and upgrade	70
Identify existing shelter locations, strengths, and weaknesses	60
Bury and/or protect utility lines (new lines or rural areas)	60
Insulate municipal infrastructure (water and sewer lines, water storage tanks)	50
Maintain and improve/expand emergency warning systems in communities across the County (ex. Sirens)	45
Restore or reconstruct the breakwall at the Grand Marais Harbor	40

Table 4.3	
Strategies by Rank Score (2013-2015)	Points
Explore the establishment and implementation of a “reverse 911” calling system	95
Implement and continue to provide countywide training and equipment to respond to a public health emergency.	75
Identify natural fire breaks where wildfires might be intercepted and contained.	75
Identify escape and entry routes in areas with high wildfire risk.	74
Provide back-up generators for water and wastewater treatment facilities to maintain acceptable operating levels during power failures.	69
Increase public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies.	66
Provide emergency generators for use at all medical and school facilities.	61
Seek funding from public and private sources to maintain and improve/expand emergency warning systems in communities throughout the County.	57
Continue to train and equip local hazardous materials emergency response teams.	57
Institute regular inspections of commercial, industrial, multi-family residential use buildings, day care facilities, churches, and other buildings where large groups of people congregate.	45

Table 4.4	
Strategies by Rank Score (2021)	Points
Continue county-wide fire training events and programs.	95
Educate the public, home, and property owners about wildfire safety.	95
Seek additional funding for equipment and training opportunities for volunteer fire departments throughout the county.	80
Maintain and develop increased partnership opportunities to coordinate with Luce Mackinac Alger Schoolcraft (LMAS) District Health Department on issues related to public health.	80
Collaborate with local agencies to correct shelter weaknesses by updating equipment, providing adequate generators, and establishing new shelters for vulnerable populations.	60
Institute regular inspections of commercial, industrial, multi-family residential use buildings, day care facilities, churches, and other buildings where large groups of people congregate.	45

4.4 Means to Accomplish Mitigation

As part of the planning process, mitigation strategies were developed to reduce potential losses of natural hazards identified in the risk assessment. The strategies present methods for local jurisdictions to improve upon existing tools. Local mitigation capabilities are existing authorities, policies, programs and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities.

Planning and regulatory capabilities are plans, policies, codes and ordinances that prevent and reduce the impacts of natural hazards. These preventive measures are designed to protect new development from hazards and ensure that potential loss is not increased. A number of preventive measures can be implemented at the local level, including:

- Building codes
- Planning and Zoning
- Subdivision regulations
- Open space preservation
- Storm water management

Building Codes are an effective way to address many of the natural hazards identified in the plan. Through building code enforcement all new and improved building are to be built or rehabilitated to withstand the impacts of certain hazards, such as snow loads, high winds, extreme temperatures and flooding. Under the State Construction Code Act (Act 230 of 1972), as amended in 1999, municipalities are required to administer and enforce the statewide building, plumbing, mechanical and electrical code. Local communities are not permitted to modify the state codes. In Alger County, the County Building Department is responsible for building code enforcement for all of the municipalities in the county. The County Building

Department also handles the electrical code enforcement within the County. Mechanical and plumbing code enforcement is handled through the State of Michigan.

Planning and Zoning guides appropriate development based on suitability and compatibility, keeping development away from sensitive areas such as floodplains, and wetlands and protecting property from certain types of natural hazards. Master plans are utilized by local governments to guide future development within their community. A community's future development is accomplished through the local planning process that reviews a community's background, current land use, and projected needs. The master plan is to serve as the basis for regulating land use. Zoning regulations are the primary tool to implement the master plan recommendations. Zoning places restrictions on lot size, use, setback, etc. Through the different zoning districts, the community can effectively guide development. With the exception of Limestone Township, all of the jurisdictions in the county (townships of AuTrain, Burt, Grand Island, Mathias, Munising, Onoto and Rock River; village of Chatham; and city of Munising) have enacted their respective zoning ordinances. Within the county, master plans have been adopted by the jurisdictions with zoning provisions.

Land Division (Subdivision) Regulations stipulate that all divisions of property be approved by the local unit of government. The act regulates the division of land in order to promote the public health, safety and general welfare. Review of property to assure the orderly layout, use of the land, and require the land be suitable for building sites and public improvements, etc. The City of Munising has enacted a subdivision control ordinance.

Open Space Preservation methods are used to keep hazardous areas from development and is especially useful in flood prone areas. Prohibiting new development in hazard-prone areas is the best way to mitigate future problems. An additional benefit to open space preservation is the maintenance of agricultural and green space/park areas. The planning process can assist in identifying suitable areas to preserve.

Storm Water Management is a method to control both urban and riverine flooding. Natural groundwater serves to absorb water, urban development attributes such as paving and sidewalks tend to increase runoff and cause flooding, overloaded drainage systems, erosion, and impaired water quality. Participating NFIP communities have minimum requirements in the floodplain to mitigate future losses.

Administrative and technical capability of the jurisdiction is the community's staff and skills used in mitigation planning and to implement specific mitigation actions. The City of Munising and the other communities in the county do not have sufficient staff for mitigation actions. The City Manager and other department heads have a multitude of responsibilities, including hazard mitigation. Quite often, the city and the other jurisdictions must rely on the expertise and technical expertise of the county for emergency management, floodplain management and building inspections.

Local emergency services authorities, resources and facilities throughout Alger County are identified in Chapter 2 of the plan. All of the authorities are effective in conducting and responding to incidents. Several agencies are deficient in terms of having the necessary equipment to maintain and expand their responsibilities. The same shortfall of resources are found in municipal public work agencies and planning departments. Continued inadequate funding will compound the problem.

Suggested ways to improve and expand upon hazard mitigation efforts are:

Building Codes:

- An expanded method of communication between the county code enforcement agency and local contractors and property owners will ensure that builders are incorporating all of the current standards and requirements.

Planning and Zoning:

- Communities with master plans should review the document and take appropriate steps to update the plan in accordance with state law. The City of Munising last updated their Master Plan in 2020. Communities should review their existing plans and incorporate hazard mitigation discussion and techniques into the plans.

Land Division (Subdivision) Regulations:

- The City of Munising has an adopted subdivision control ordinances. Most jurisdictions have land division ordinances. Communities should examine whether enactment of a subdivision control ordinance is appropriate for their jurisdiction.

Open Space Preservation:

- Open space preservation can be achieved through a number of means including acquisition, donation by developer's easement or regulated setback buffers or through provisions contained in the community's zoning ordinance. Communities are encouraged to review these techniques and adopt provisions that are suitable for their situation.

Storm Water Management:

- Existing storm water management programs could be expanded to require storm water does not leave a new development at a higher rate than pre-development conditions. In addition, the storm water regulations can utilize natural vegetation, buffers, and retention basins to minimize impacts within the watershed. A coordinated effort amongst affected municipalities is the most effective way to address the larger problem.

Staff Capabilities:

- The opportunity exists for jurisdictions with limited resources to utilize the regional planning agency to support mitigation planning efforts.

Emergency Services:

- The opportunity exists for agencies to further educate the public on techniques and methods to mitigate natural hazards, such as preventing wildfires and flooding, as well as suitable locations in the event of a tornado or other severe weather event.
- Seeking grant funds to acquire needed equipment is paramount to maintain and expand the level of service in order to respond to hazards. Joint or pooled purchasing arrangements can result in savings through bulk purchase and negotiated rates. A regional entity could offer pooled purchasing to interested local agencies.

5.0 Action Plan

The overall purpose of this plan is to identify strategies to mitigate the hazards identified to reduce threats to public safety and property. These strategies strive to mitigate the higher risk hazards of severe weather, disruption of municipal infrastructure, loss of property and lives from structural and wildfires, and public health emergencies.

5.1 Mitigation Actions

This section describes the action to be taken, the agency responsible, and available funding source if known. Six federal funding sources for hazard mitigation are:

HMGP: Hazard Mitigation Grant Program
PDM: Pre-Disaster Mitigation Program
FMA: Flood Mitigation Assistance Program
EMPG: Emergency Management Performance Grants
PFG: HMGP Post Fire Grants
BRIC: Building Resilient Infrastructure and Communities

Other funding sources noted in this chapter are:

HMG: Hazardous Materials Grant Program
HMEP: Hazardous Materials Emergency Planning Grant
HSGP: Homeland Security Grant Program
AFG: Assistance to Firefighters Grant Program
USDA-RD: USDA Rural Development

Possible funding sources were listed under each action. The listed funding source is not an inclusive listing of available resources nor guarantees the project would be funded through that funding source. Funding of projects listed with “local resources” may be accomplished through local funds or through other grant funds obtained by an agency. Additional information on available hazard mitigation funding can be found in FEMA’s Hazard Mitigation Assistance Unified Guidance document (2013) and FEMA’s website.

The following “Hazard Related Actions” are listed in the order of priority as explained in Tables 4.2, 4.3, and 4.4 - Strategies by Rank Score. Table 5.1 summarizes the actions and agencies/personnel that would be responsible for undertaking the actions listed.

Agencies and organizations will undertake the following strategies provided there is adequate funding and resources to accomplish the project. Many of the strategies are on-going; other projects have estimated completion dates shown below. Completion of the projects should be directed towards those projects that have the highest priority.

Hazard Related Actions from the 2007 Plan

Action: Educate the public about emergency warning systems available in Alger County.

Lead Agency: County Emergency Management

Funding Source: Local Resources, HMGP

Time Frame: On-going

Status: Alger County is working with the local dam owner to educate the public.

Action: Provide generators for use at municipal fuel pumping facilities

Lead Agency: County Emergency Management

Supporting Agency: Local Units of Government

Funding Source: HMGP

Time Frame: FY2009

Status: Alger County has access to a portable fueling pump.

Action: Participate in the “Firewise Communities” Wildfire Protection Program.

Lead Agency: local Fire Departments

Supporting Agency: Local Units of Government, County Emergency Management

Funding Source: Local Resources

Time Frame: On-going

Status: Alger County began participating in the Community Wildfire Protection Program (CWPP) in 2014. The Firewise program is no longer active in Michigan but there is still coordination with DNR and Forest Service on fire education.

Action: Educate the public about wildfire safety.

Lead Agency: local Fire Departments

Supporting Agency: County Emergency Management

Funding Source: Local Resources, HMGP, Assistance to Firefighters Grant Program

Time Frame: On-going

Status: Alger County is working on this action through the CWPP. The Firewise program is no longer active in Michigan but there is still coordination with DNR and Forest Service on fire education.

Action: Update or expand public education efforts for emergency preparedness.

Responsible Agency: County Emergency Management

Supporting Agency: Emergency Medical Services

Funding Source: HMG, PDM

Time Frame: On-going

Status: Alger County continues to expand public education efforts for emergency preparedness.

Action: Ensure fire departments and other first responders countywide have the appropriate training and equipment to respond to structural and commercial fires.

Lead Agency: County Emergency Management

Supporting Agency: Local Fire Departments

Funding Source: Assistance to Firefighters Grant Program, Michigan Volunteer Fire Assistance

Time Frame: On-going

Status: Fire departments and County Emergency Management continue to ensure first responders have appropriate training.

Action: Increased weather tower coverage and use of NOAA Weather Radio.

Lead Agency: County Emergency Management

Funding Source: PDM, HMGP, USDA Rural Utilities

Time Frame: On-going

Status: Alger County has two weather towers that provide coverage – one in Munising and one in Grand Marais.

Action: Update site emergency plans for schools, factories, office buildings and other appropriate sites.

Lead Agency: County Emergency Management

Supporting Agency: Local Units of Government, local Fire Departments

Funding Source: PDM, HMGP

Time Frame: On-going

Status: County Emergency Management coordinates lockdown/active shooter and tornado preparedness trainings at local schools.

Action: Develop, and keep current, a database of volunteers that can assist during a major public health event.

Lead Agency: County Emergency Management

Funding Source: Local Resources

Time Frame: On-going

Status: County Emergency Management has a volunteer database and updates it as needed.

Action: Create firebreaks in high-risk forest areas.

Lead Agency: US Forest Service

Supporting Agency: MDNR, Local Fire Departments

Funding Source: HMGP, PDM, Local resources

Time Frame: On-going

Status: Alger County is working on this action through the CWPP. The Firewise program is no longer active in Michigan but there is still coordination with DNR and Forest Service.

Action: Utilize snow fences or living fences to limit the blowing and drifting of snow over critical roadway segments.

Lead Agency: County Emergency Management

Supporting Agency: MDOT, county road commission

Funding Source: HMGP, PDM, MDOT

Time Frame: On-going

Status: Snow fences are installed as needed.

Action: Countywide training and equipment to respond to a public health emergency.

Lead Agency: County Emergency Management, Public Health

Supporting Agency: LMAS Public Health Department, Local Units of Governments

Funding Source: Local Resources

Time Frame: On-going

Status: Communications trainings are conducted quarterly, and basic SNS response trainings are conducted annually.

Action: Develop and continue to update existing plans to cover possible public health emergency events.

Lead Agency: LMAS Public Health Department

Supporting Agency: Local Units of Government, County Emergency Management

Funding Source: Local Resources

Time Frame: On-going

Status: These plans are updated annually or more often if needed.

Action: Create a defensible space around property in high-risk forest areas.

Lead Agency: Local Fire Departments

Supporting Agency: Local Units of Government, County Emergency Management

Funding Source: HMGP

Time Frame: On-going

Status: Alger County is working on this action through the CWPP.

Action: Provide adequate property access for emergency vehicles and fire equipment.

Lead Agency: Local Units of Government

Supporting Agency: Local Fire Departments, US Forest Service

Funding Source: HMGP, Local Resources

Time Frame: On-going

Status: Alger County is working on this action through the CWPP. The Firewise program is no longer active in Michigan but there is still coordination with DNR and Forest Service.

Action: Correct shelter weaknesses by updating equipment, providing adequate generators, and establishing shelters for vulnerable populations.

Lead Agency: County Emergency Management

Supporting Agency: Red Cross

Funding Source: Local Resources, HMGP

Time Frame: On-going

Status: Shelters with generators are located in the County building in the City of Munising, in Mathias Township, Rock River Township, Au Train Township, and Burt Township.

Action: Install or upgrade sprinkler systems in commercial, industrial, and large residential use buildings.

Lead Agency: Building Code Department

Funding Source: Local Resources

Time Frame: FY2011

Status: Local businesses and landlords are encouraged to install and upgrade sprinkler systems.

Action: Identify existing shelter locations, strengths, and weaknesses.

Lead Agency: Red Cross

Funding Source: Local Resources

Time Frame: On-going

Status: Alger County has identified existing shelter locations and necessary upgrades have been made by local authorities.

Action: Bury and/or protect utility lines (new lines or rural areas).

Lead Agency: Utilities

Supporting Agency: Local Units of Government, County Emergency Management

Funding Source: HMGP, PDM

Time Frame: On-going

Status: Alger County encourages utilities to bury and/or protect utility lines and power outages in the County have been greatly reduced since this effort.

Action: Insulate municipal infrastructure (water and sewer lines and water storage tanks).

Responsible Agency: City of Munising, Burt Township, Mathias Township, Village of Chatham, Rock River Township

Funding Source: HMGP, PDM, CDBG

Time Frame: On-going

Status: Insulation/upgrades to municipal infrastructure has taken place in the City of Munising, Burt Township, and Mathias Township.

Action: Maintain and improve/expand emergency warning systems in communities across the County.

Lead Agency: County Emergency Management

Supporting Agency: Local Fire Departments, Law Enforcement, Emergency Medical Services, and Public Health.

Funding Source: PDP, HMGP

Time Frame: FY2015

Status: Alger County is working with the local dam owner to ensure an adequate emergency warning system is in place.

Action: Restore or reconstruct the break wall at the Grand Marais harbor.

Responsible Agency: Burt Township

Funding Source: Unknown

Time Frame: FY2020

Status: The break wall was reconstructed in early 2014.

Additional Strategies for the 2014 Update

Action: Explore the establishment and implementation of a “reverse 911” calling system

Responsible Agency: County Emergency Management

Funding Source: HMGP, EMPG

Time Frame: On-going

Action: Improve/expand emergency warning systems in communities throughout the County.

Responsible Agency: County Emergency Management

Funding Source: HMGP, PDM

Time Frame: On-going

Action: Provide emergency generators for use at all medical and school facilities

Responsible Agency: County Emergency Management

Funding Source: HMGP, PDM

Time Frame: On-going

Action: Institute regular inspections of commercial, industrial, multi-family residential use buildings, day care facilities, churches, and other buildings where large groups of people congregate.

Responsible Agency: County Board, Local Units of Government

Funding Source: Local Resources

Time Frame: FY2020/On-going

Action: Identify escape and entry routes in areas with high wildfire risk.

Responsible Agency: U.S. Forest Service, Michigan DNR, County Sherriff Dept., all fire departments

Funding Source: Local Resources

Time Frame: FY2014

Action: Identify natural fire breaks where wildfires might be intercepted and contained.

Responsible Agency: U.S. Forest Service, Michigan DNR, County Sherriff Dept., all fire departments

Funding Source: Local Resources

Time Frame: FY2014

Action: Implement and continue to provide countywide training and equipment to respond to a public health emergency.

Responsible Agency: LMAS, County Emergency Management, fire departments, law enforcement, emergency medical services

Funding Source: Local Resources, EMPG

Time Frame: On-going

Action: Provide back-up generators for water and wastewater treatment facilities to maintain acceptable operating levels during power failures.

Responsible Agency: County Emergency Management

Funding Source: HMGP, PDM

Time Frame: On-going

Action: Increase public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies.

Responsible Agency: LMAS Public Health Department

Funding Source: Local Resources

Time Frame: On-going

Additional Strategies for the 2021 Update

Action: Continue county-wide fire training events and programs.

Lead Agency: County Emergency Management

Funding Source: Local Resources, HMGP, EMPG, AFG

Time Frame: On-going

Action: Educate the public, home, and property owners about wildfire safety.

Lead Agency: Local Fire Departments, US Forest Service

Supporting Agency: County Emergency Management

Funding Source: Local Resources, HMGP, Assistance to Firefighters Grant Program

Time Frame: On-going

Action: Maintain and develop increased partnership opportunities to coordinate with Luce Mackinac Alger Schoolcraft (LMAS) District Health Department on issues related to public health.

Responsible Agency: LMAS Public Health Department

Supporting Agency: County Emergency Management

Funding Source: Local Resources

Time Frame: On-going

Action: Collaborate with local agencies to correct shelter weaknesses by updating equipment, providing adequate generators, and establishing new shelters for vulnerable populations.

Lead Agency: Red Cross

Funding Source: Local Resources

Time Frame: On-going

Action: Institute regular inspections of commercial, industrial, multi-family residential use buildings, day care facilities, churches, and other buildings where large groups of people congregate.

Responsible Agency: County Board, Local Units of Government

Funding Source: Local Resources

Time Frame: On-going

Administration Actions Related to Hazard Mitigation

Action: Adopt the Alger County Hazard Mitigation Plan.

Responsible Agency: Alger County Board, Local Units of Government

Funding Source: Local Resources

Time Frame: Within six months after FEMA approval

Status: The plan was adopted by the Alger County Board of Commissioners on July 20, 2015.

Action: Consider hazard mitigation planning in planning and zoning documents.

Responsible Agency: Alger County, townships of AuTrain, Burt, Grand Island, Limestone, Mathias, Munising, Onota, and Rock River, village of Chatham, city of Munising

Funding Source: Local resources

Time Frame: On-going

Status: Local units of government continue to consider hazard mitigation planning in planning and zoning documents.

Table 5.1 Summary of Actions and Responsible Agencies							
	County-wide training events	Wildfire education	Coordinate public health needs with LMAS	Correct local shelter needs and weaknesses	Regular building inspections for fire and public safety	Adopt the hazard mitigation plan	Consider hazard mitigation in planning and zoning documents
County Board			X			X	X
County Emergency Management	X	X	X	X	X		
Local Emergency Planning Committee							
Law Enforcement	X				X		

Table 5.1 Summary of Actions and Responsible Agencies							
	County-wide training events	Wildfire education	Coordinate public health needs with LMAS	Correct local shelter needs and weaknesses	Regular building inspections for fire and public safety	Adopt the hazard mitigation plan	Consider hazard mitigation in planning and zoning documents
Fire Departments	X	X		X	X		
Emergency Medical Services	X		X		X		
Public Health	X		X		X		
Human Services	X		X	X			
MDOT	X						
Township/City/Village							
Au Train Twp.						X	X
Burt Twp.						X	X
Grand Island Twp.						X	X
Limestone Twp.						X	X
Mathias Twp.						X	X
City of Munising						X	X
Munising Twp.						X	X
Onota Twp.						X	X
Rock River Twp.						X	X
Village of Chatham						X	X

5.2 Plan Maintenance

Maintenance of the plan requires the responsible agencies to perform the following:

- Reviewing and evaluating the original plan for changes due to new circumstances, information, or projects.
- Updating the plan on an annual or 5-year basis.
- Continued public participation in the hazard mitigation plan.

5.2.1 Reviewing, Evaluating, and Updating

The Alger County Local Emergency Planning Committee will be responsible for reviewing and updating the plan. Review of the plan is recommended annually. If Alger County is unable to examine the plan annually, the plan shall be reviewed every five years and updated if necessary. The 5-year mandatory review and update of the hazard mitigation plan is needed due to ever changing circumstances throughout Alger County. The original hazard mitigation plan was reviewed and updated in 2013-2015, and 2021. The next mandatory update of this hazard mitigation plan will be scheduled in five years from the date of FEMA plan approval.

Reviewing and evaluating the hazard mitigation plan is crucial since changes in the type, extent, and number of hazards are likely to occur over time. For instance, the plans identified risks and hazards may increase or decrease, new hazards may be brought forward due to new development patterns, or strategies may be implemented and new ones proposed.

The County Emergency Management Coordinator is responsible for scheduling a meeting of the Local Emergency Planning Committee (LEPC) in February of each year to evaluate the plan's performance within the past calendar year. The LEPC may, if it chooses, monitor the community's land use planning to ensure that mitigation goals and objectives are being considered in the day-to-day land use decisions being made. The LEPC meetings are open to the public; a notice will be sent to local units of government inviting them to attend.

Suggested measures for evaluating the plan are: changes in the number, type and/or extent of risk in the county or local jurisdiction; number of mitigation strategies accomplished; implementation problems; and recommendations on new projects or revision of current action items. The plan evaluation results will be summarized into a report. The need for plan amendments or updates will be determined at this time.

The County Board of Commissioners will approve recommendations for any appropriate changes. Local governments that have adopted the County Hazard Mitigation Plan would then adopt the new amendments or new updated plan. Communities that have local land use control, i.e. locally adopted zoning ordinances, would be requested to consider and adopt the amendments or a new updated plan.

It is recommended that the mitigating actions described in the County Hazard Mitigation Plan be incorporated into planning documents prepared and adopted by either the Alger County Board of Commissioners or local units of government within the county. Information contained in the mitigation plan would be useful to communities as they prepare or develop various planning documents. One suggested planning document is the comprehensive or master plan; the procedures for amending or adopting a plan are outlined in the in the respective County, Township and Municipal Planning Acts. The planning acts require communities with an adopted plan to review the plan every five years to determine if any necessary changes should

be made to the plan. At this five-year review stage, the community should consult the Mitigation Plan to determine what findings and actions included in the Hazard Mitigation Plan are appropriate for inclusion into the local plan. It is recommended that the community not wait for the five-year interval, but rather undertake an amendment to the plan using appropriate actions or other findings from the plan. The mitigating actions could be incorporated into the goals and objectives section of the comprehensive plan.

Another plan that may be prepared is a “Community Development Plan”, a required plan when a community applies for a federal Community Development Block Grant. The Community Development Plan includes an assessment of problems and needs of the community, a brief community profile and possible short-term and long-term activities to address identified needs and problems. The Hazard Mitigation Plan can be utilized in presenting the community profile, identification of community needs and problems, along with activities to address the identified hazard needs and problems.

5.2.2 Public Participation

The County LEPC assures on-going public participation and awareness of the Plan. The Emergency Management Coordinator or other members of the LEPC attend meetings, at least annually, to update local officials and residents on hazard mitigation and inquire on potential projects. The LEPC meets with such organizations as: Township Association, Alger County Fire Chief Association, City of Munising, and the Alger County Board of Commissioners. On-going public review of the original Alger County Hazard Mitigation Plan was achieved through the following:

- A letter was sent notifying local governments within Alger County and neighboring counties and members of the LEPC that the County Board has adopted the plan.
- A copy was made available for public review at the Munising School/Public Library and the Alger County Courthouse.
- A notice was placed in the local newspaper informing the public on where they could review the plan.
- The County Emergency Management Coordinator arranged to have hazard mitigation information displayed on websites serving Alger County. Local officials and residents alike could easily access this type of media.

The same public participation actions took place for subsequent plan updates.

APPENDIX A

General Information and Statistics For:

Alger County

Au Train Township

Burt Township

Grand Island Township

Limestone Township

Mathias Township

City of Munising

Munising Township

Onota Township

Rock River Township

Village of Chatham

Alger County

Office Location	County Building 101 Court Street Munising, MI 49862-1196
Total Area	5,049.08 square miles (917.83 land) 3,231,411.2 acres (587,411.2 land)
Population (2019 est.)	9,151
Housing Units	6,691 (2,155 for seasonal, recreational or occasional use)
Total Households	3,007
Average Household Size	3.04 persons
State Equalized Valuation (Residential) (2021)	\$440,619,000

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021

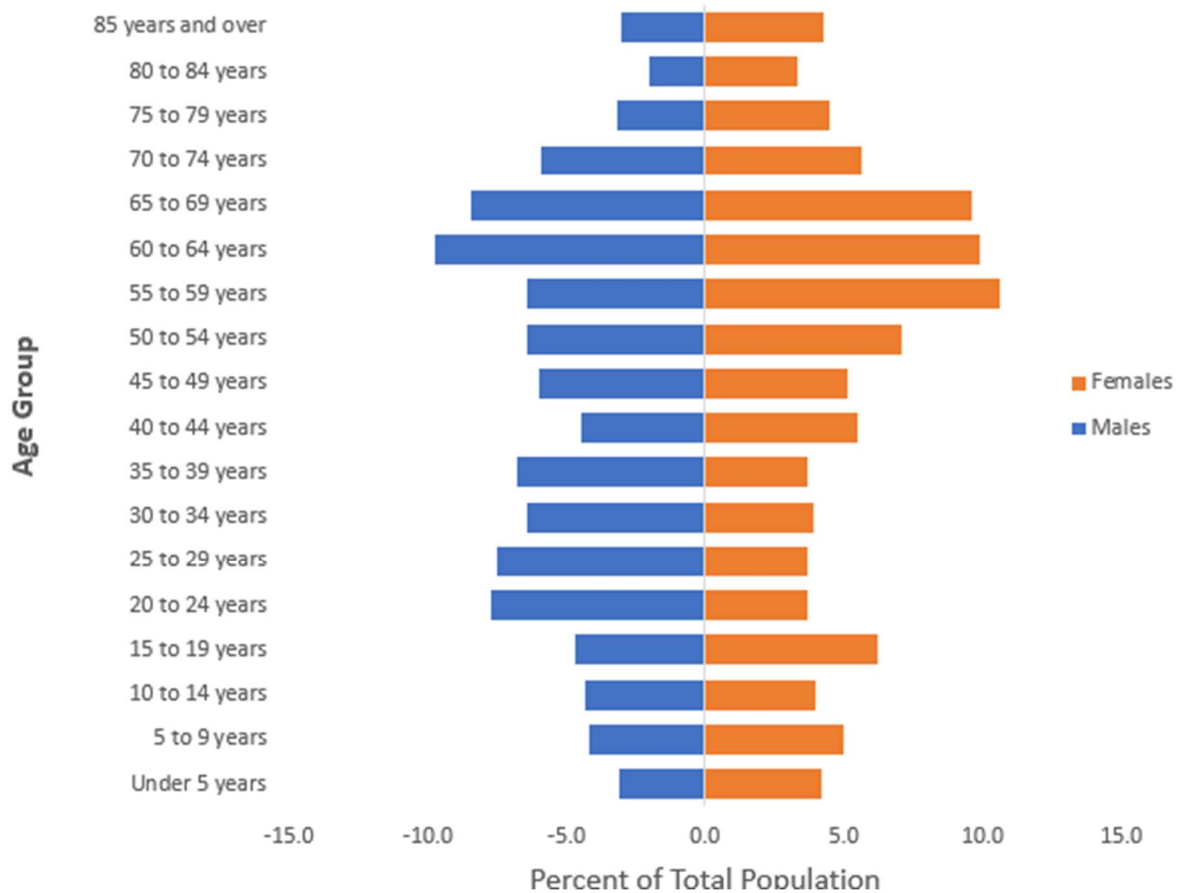
County History

Alger County was organized March 17, 1885, after being detached from Schoolcraft County. It is named for Russell Alexander Alger who was serving as Michigan's governor at that time.

Early settlements were directly related to the area's natural resources, principally its forests. The advent of railroads in the late 1800s created boom times in the timber industry. Charcoal was produced from local hardwoods as smelting fuel for the iron ore industry. Distinctive sandstone, prized as a building material, was quarried at several locations. Hemlock trees provided tannin for local tannery operations.

As the logging boom slowed in the early 1900s, many left the area to seek livelihoods elsewhere. Commercial fishing and farming became more important to the local economy. A major tourist industry emerged because of the uncommon and bountiful natural features of the area. Much of the county land area is publicly owned as depicted on Map 3. Alger County is well known today as a year-round tourist destination in the upper Great Lakes area.

Alger County Population by Age & Sex (2019 est.)



2019 Median Age: 49.5
2010 Median Age: 47.3
2000 Median Age: 41.2

Source: U.S. Census Bureau. Compiled by CUPPAD Regional Commission, 2021.

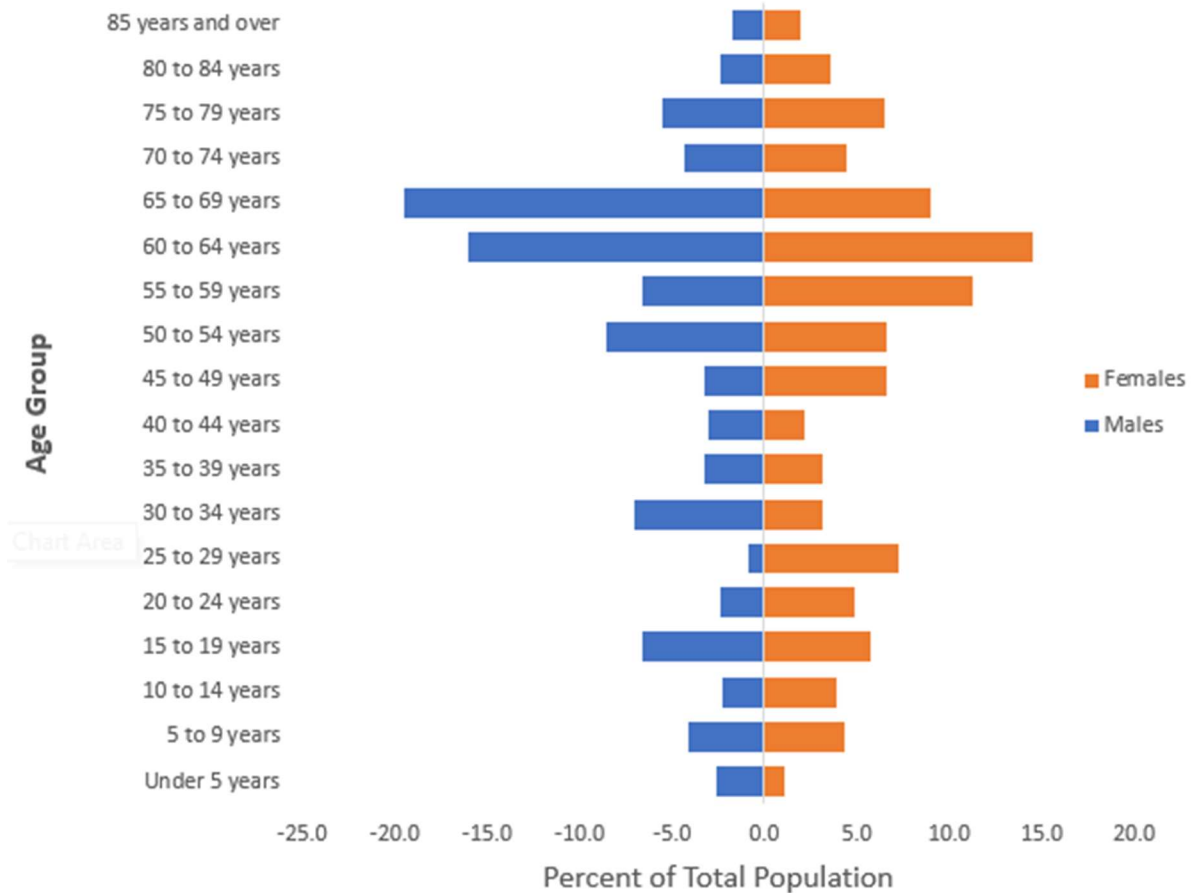
Au Train Township: T44N, 45N, 46N & 47N - R19W & 20W

Office Location	N7569 Spruce Street Au Train, MI 49806
Mailing Address	P.O. Box 33 Au Train, MI 49806
Phone	906.892.8265
Total Area*	165.5 square miles (142.05 land) 105,920 acres (90,912 land)
Population (2019)	1,019
Housing Units (2020)	1,151 (655 for seasonal, recreational or occasional use)
Total Households (2019)	459
Average Household Size (2010)	2.54 persons
Fire Department	Au Train Township Volunteer Fire Dept.
Police Department	Alger County Sheriff
School District(s)	Munising Area Schools, Au Train-Onota Schools, Superior Central School District
State Equalized Valuation (Residential) (2021)	\$99,915,700

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021

Au Train Township extends for about 22 miles from its southern boundary with Delta County north to Lake Superior. More than half of the township is within the Hiawatha National Forest. Highways M-28, M-94 and Forest Lake Road (H-03) are the most important transportation routes in the township. Roughly 20 percent of the land area is privately held by Lyme Great Lakes Timberlands for commercial management. The communities of Au Train and Christmas and adjacent areas are the most intensively developed and most populous. Generally, the resident and seasonal populations are widely dispersed where private, buildable land is available. Almost half of all housing units are limited to seasonal or occasional use.

Au Train Township Population by Age & Sex (2019 est.)



2019 Median Age: 56.5

2010 Median Age: 51.2

2000 Median Age: 42.3

Source: U.S. Census Bureau, 2019. Compiled by CUPPAD Regional Commission, 2021.

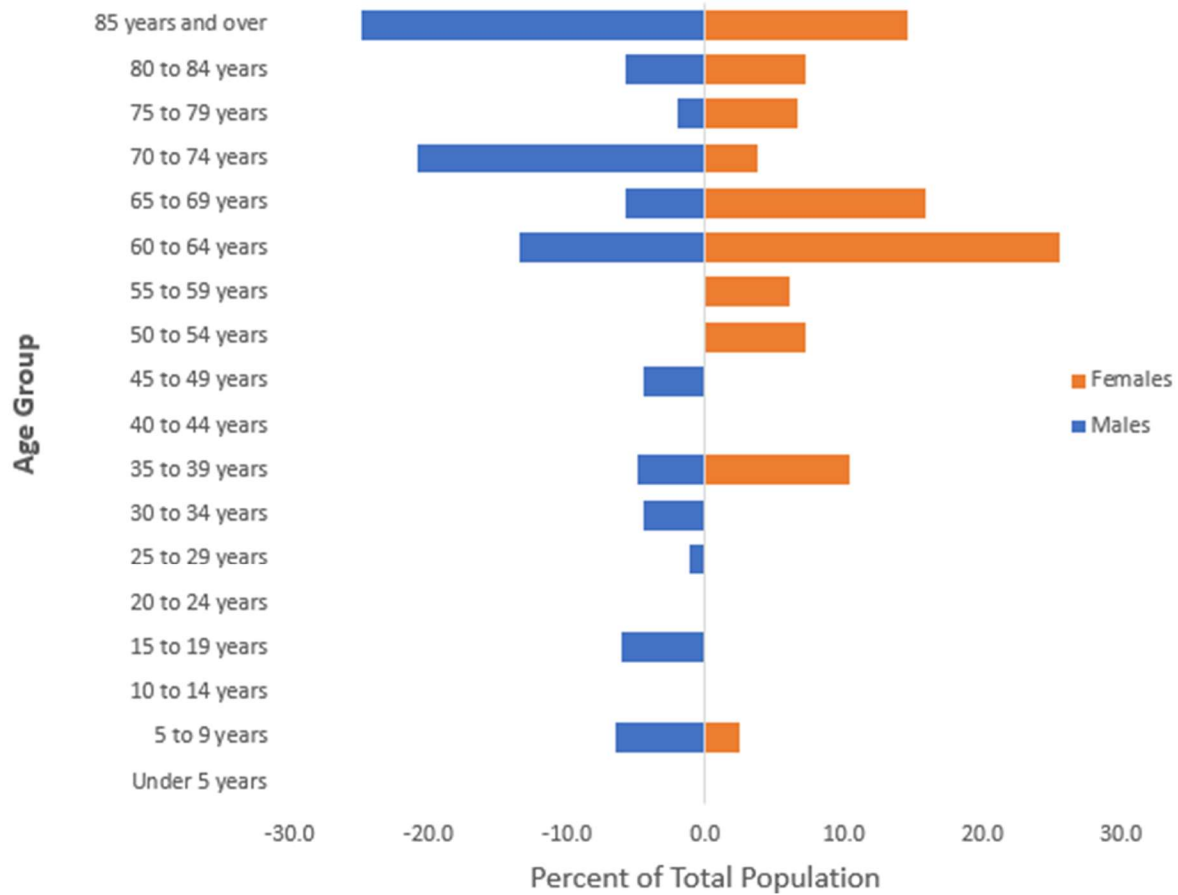
Burt Township: T48N, 49N & 50N - R 13W, 14W, 15W & 16W

Office location	Burt Township Office Grand Marais Avenue (E21837) Grand Marais, MI 49839
Mailing address	P.O. Box 430 Grand Marais, MI 49839
Phone	906.494.2381
Total Area*	258.1 square miles (230.95 land) 165,184 acres (147,808 land)
Population (2019)	411
Housing Units (2019)	733 (405 for seasonal, recreational or occasional use)
Total Households (2019)	179
Average Household Size (2019)	2.29 persons
Fire Department	Burt Township Fire Department
Police Department	Alger County Sheriff
School District(s)	Burt Township School
State Equalized Valuation (Residential) (2021)	\$ 65,654,500

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021

Burt Township borders Schoolcraft County on the south and Luce County on the east. It stretches some 24 miles from east to west and up to 13 miles from the southern boundary to Lake Superior. Highway M-77 is the main transportation route. County road H-58 is partially paved and connects Munising to Grand Marais. Burt Township Airport is about 3 miles east of M-77. About 30 percent of the land area is publicly owned and managed as parts of either the Lake Superior State Forest or Pictured Rocks National Lakeshore. Lyme Great Lakes Timberlands holdings account for about half the land area. The most concentrated area of development is Grand Marais. More than 50 percent of the housing units are occupied on an occasional or seasonal basis.

Burt Township Population by Age & Sex (2019 est.)



2019 Median Age: 69.2
2010 Median Age: 62.6
2000 Median Age: 56.7

Source: U.S. Census Bureau, 2019. Compiled by CUPPAD Regional Commission, 2021.

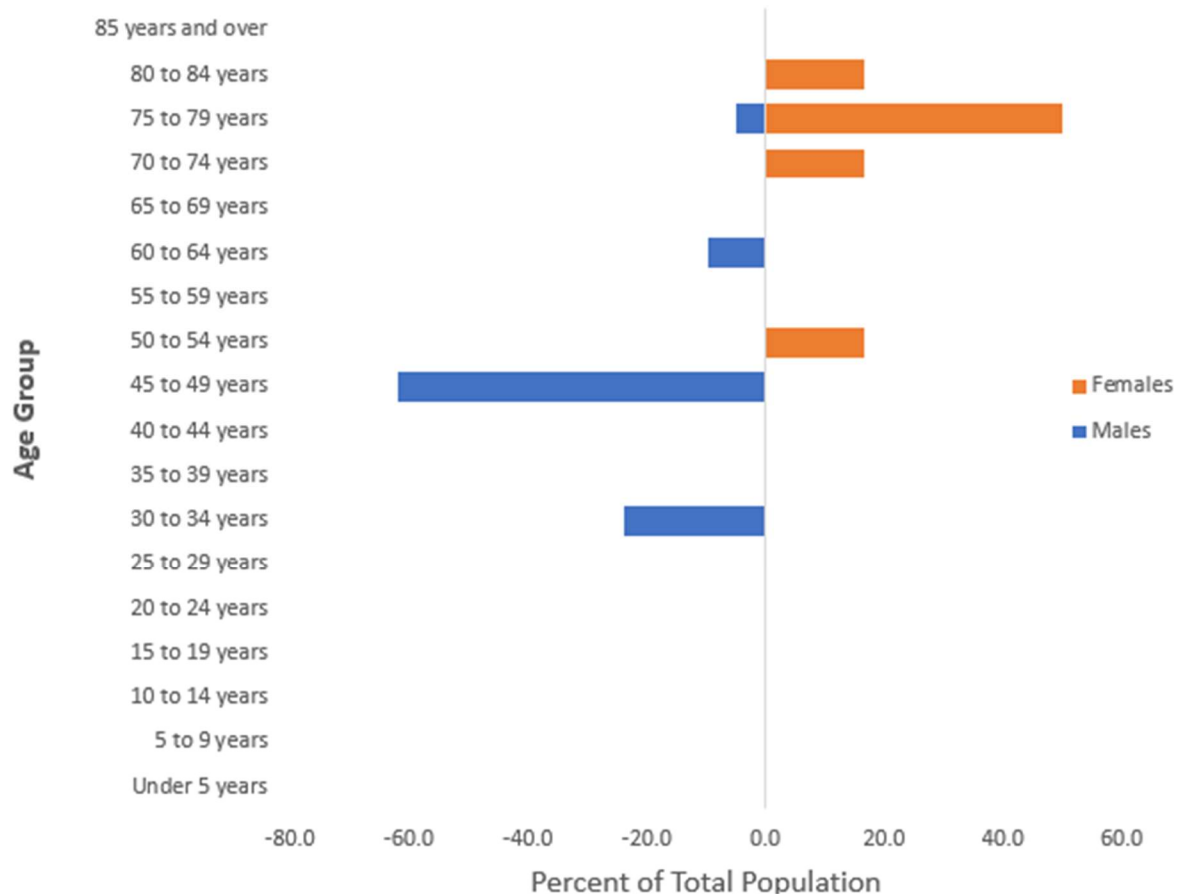
Grand Island Township: T47N & 48N - R19W

Office location	-
Mailing address	P.O. Box 215 Munising, MI 49862
Phone	906.387.3889
Total Area*	49.0 square miles (22.38 land) 31,369 acres (14,323.2 land)
Population (2019)	35
Housing Units (2019)	46 (32 for seasonal, recreational or occasional use)
Total Households (2019)	12
Average Household Size (2019)	2.75 persons
Fire Department	Au Train Township Volunteer Fire Department
Police Department	Alger County Sheriff
School District(s)	Munising Public Schools
State Equalized Valuation (Residential) (2021)	\$4,525,100

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021

Grand Island Township land is mostly publicly owned as part of the Hiawatha National Forest. Grand Island itself contains more than 90 percent of the township's land area. A small amount of land on the island (approximately 40 acres) is privately owned. The limited "mainland" development is generally well dispersed along and near highway M-28 from the city of Munising to Powell Point. The U.S. Forest Service accesses Grand Island via a tug from a dock facility at Powell Point. Only 12 of the township's 46 housing units are occupied year-round.

Grand Island Township Population by Age & Sex (2019 est.)



2019 Median Age: 45.9

2010 Median Age: 50.5

2000 Median Age: 45.8

Source: U.S. Census Bureau, 2019. Compiled by CUPPAD Regional Commission, 2021.

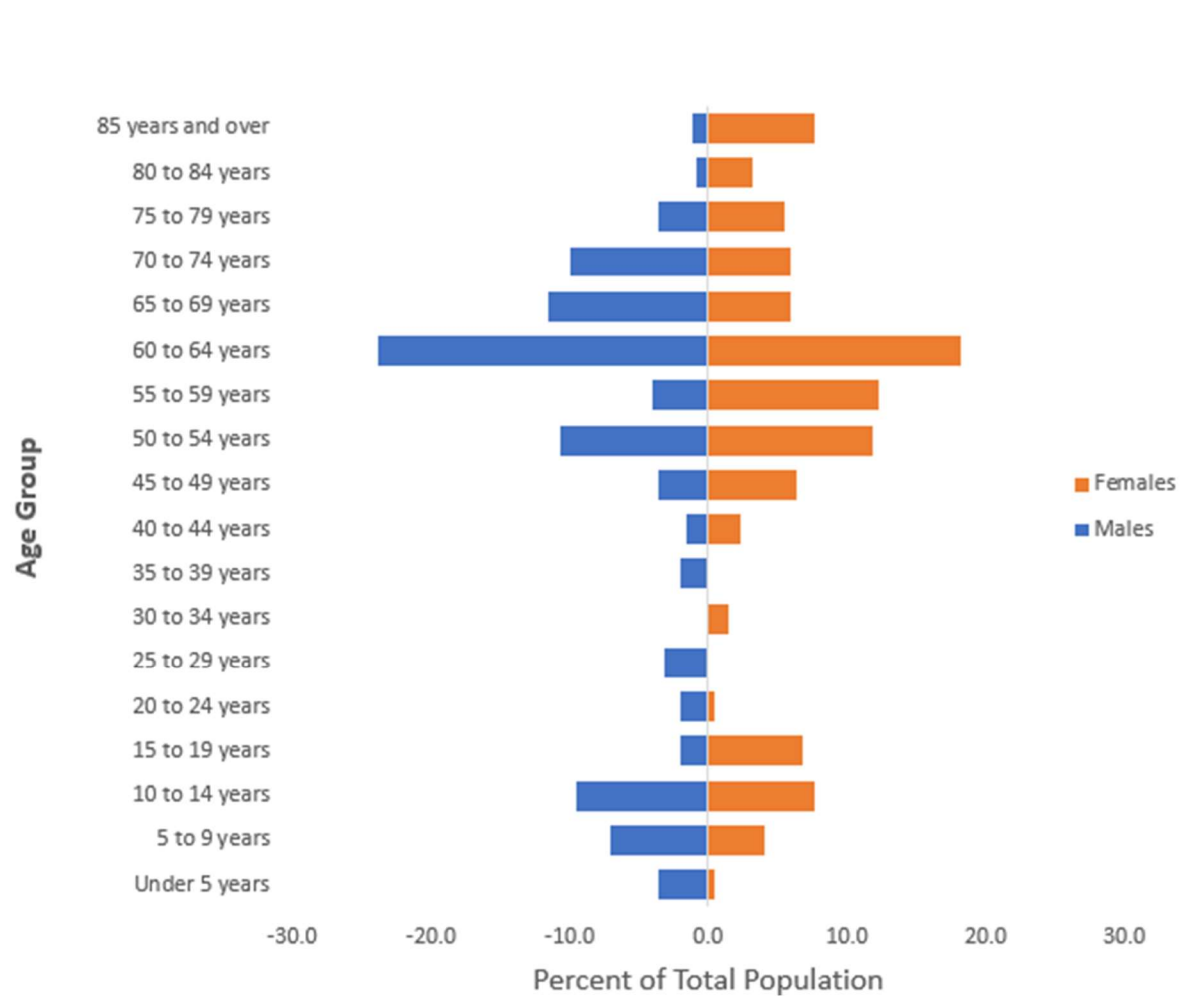
Limestone Township: T44N & 45N - R21W & 22W

Office location	N3010 State Road 67 Limestone, MI 49816
Mailing address	(send to supervisor or clerk)
Phone	906.439.5555
Total Area*	75.05 square miles (74.56 land) 48,032 acres (47,718.4 land)
Population (2019)	392
Housing Units (2019)	293 (115 for seasonal, recreational or occasional use)
Total Households (2019)	176
Average Household Size (2019)	2.68 persons
Fire Department	Mathias Township V.F.D. (contracted annually)
Police Department	Alger County Sheriff
School District(s)	Superior Central School District
State Equalized Valuation (Residential) (2021)	\$24,789,800

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021.

Limestone Township is irregularly shaped and extends 12 miles across at its widest point and from 3 to 9 miles between southern and northern boundaries. Highways US-41, M-67, and M-94 are the major transportation corridors. The most important local traffic routes are H-44 and H-01. Nearly 40 percent of the land area is publicly owned. Land designated as commercial forest reserve accounts for about 10 percent of the total township land area. A small number of commercial establishments are found along highway corridors. Residential development is dispersed in no particular pattern with about 40 percent of the housing units used as camps or cottages.

Limestone Township Population by Age & Sex (2019 est.)



2019 Median Age: 59.7

2010 Median Age: 48.5

2000 Median Age: 45.5

Source: U.S. Census Bureau, 2019. Compiled by CUPPAD Regional Commission, 2021.

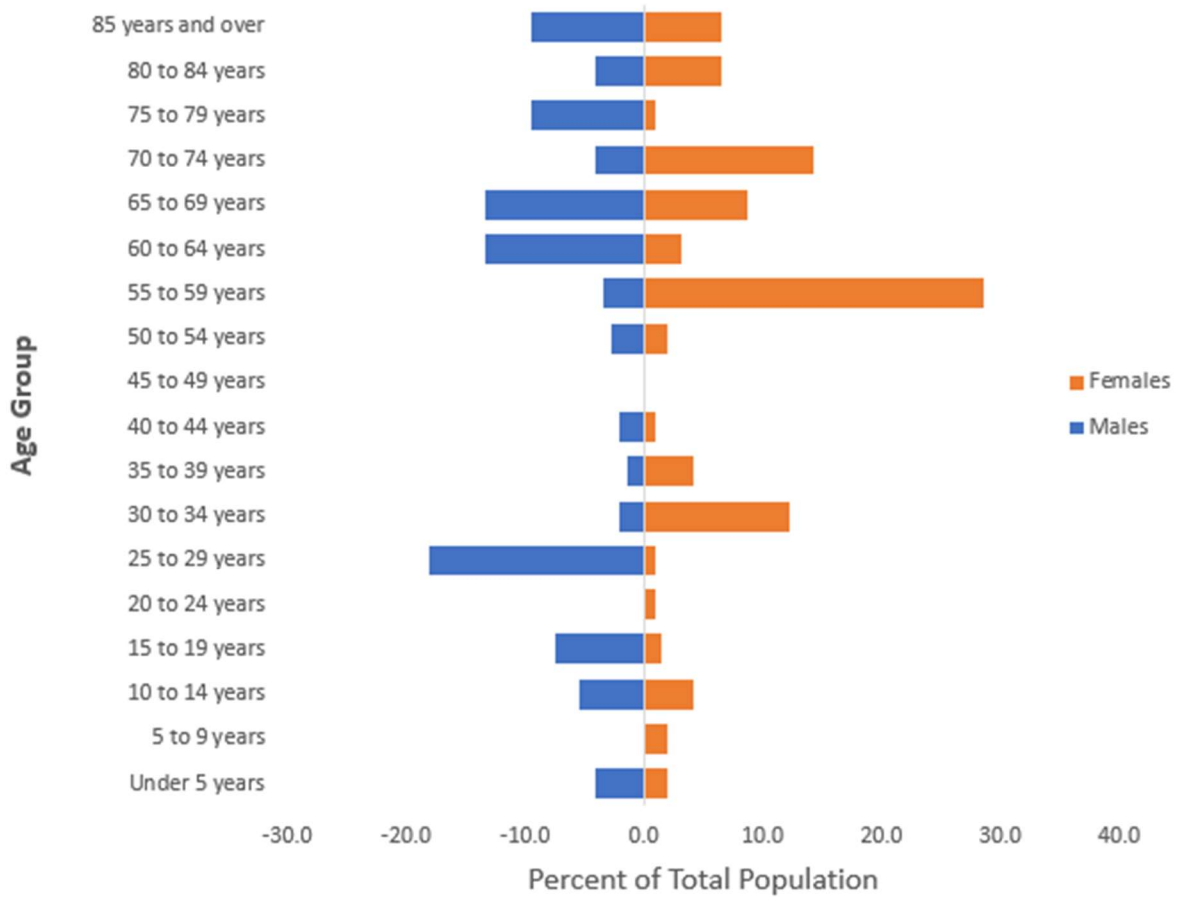
Mathias Township: T44N - R20W & 21W

Office location	Township Hall M-67 Trenary, MI 49891
Mailing address	P.O. Box 317 Trenary, MI 49891
Phone	906.446.3226
Total Area*	72.08 square miles (71.02 land) 46,131.2 acres (45,452.8 land)
Population (2019)	532
Housing Units (2019)	463 (231 for seasonal, recreational or occasional use)
Total Households (2019)	144
Average Household Size (2019)	3.27 persons
Fire Department	Mathias Township Volunteer Fire Department
Police Department	Alger County Sheriff
School District(s)	Superior Central School District
State Equalized Value (Residential) (2021)	\$25,435,200

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021

Mathias Township is 12 miles wide and 6 miles north-south. Highways US-41 and M-67 are the major roadways with county road H-01 adding an important transportation linkage for local traffic. More than one-quarter of the total township land area is within the Escanaba River State Forest and Hiawatha National Forest. Nearly 20 percent of township land is designated commercial forest reserve. The community of Trenary is the commercial and residential center of the township. A community water system was constructed in 1991 and serves about 75 customers in Trenary. Seasonal and recreational housing units comprise around half of the total housing stock.

Mathias Township Population by Age & Sex (2019 est.)



2019 Median Age: 57.8

2010 Median Age: 48.7

2000 Median Age: 44.6

Source: U.S. Census Bureau, 2019. Compiled by CUPPAD Regional Commission, 2021.

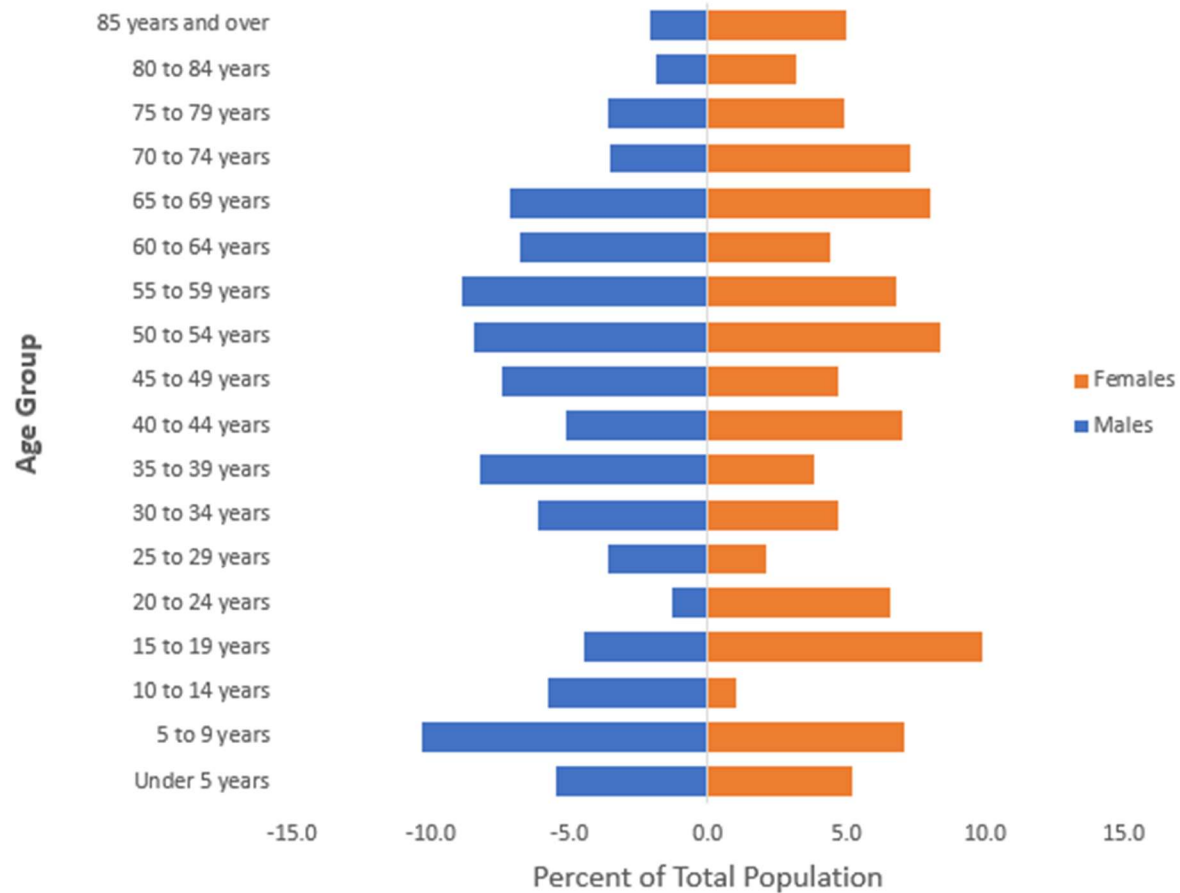
City of Munising: T46N & 47N - R19W

Office location	301 E. Superior St., Munising, MI 49862
Mailing address	same as above
Phone	906.387.2095
Total Area*	9.13 square miles (5.36 land) 5,843.2 acres (3,430.4 land)
Population (2019)	1,986
Housing Units (2019)	1,198 (280 for seasonal, recreational or occasional use)
Total Households (2019)	779
Average Household Size (2019)	2.63 persons
Fire Department	Munising Volunteer Fire Department
Police Department	Munising Police Department
School District(s)	Munising Public Schools
State Equalized Valuation (Residential) (2021)	\$49,556,700

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021

Munising (city) is the county seat and commercial and population center of the county. Its northern boundary is formed by almost 7 miles of Lake Superior (Munising Bay) shoreline, some of which is included in the Pictured Rocks National Lakeshore. Steep terrain begins inland at distances of 600 to 3,000 feet, a condition that has limited development. About 20 percent of the land area is intensively developed; the remainder is mostly forested. Highway M-28 (Munising Avenue) is the major transportation corridor. East Munising Avenue/H-58, Washington Street and Connors Road are the most significant local transportation routes. Municipal water and wastewater systems serve most of the city. Wastewater service was extended to the Alger Correctional Facility in 1990. Four wells in the city provide service to about 1,100-metered customers. Two wells are at the city-owned industrial park in Munising Township. Munising Bay is a natural deep-water port with some commercial usage. About 20 percent of the housing units are not used for year-round habitation.

City of Munising Population by Age & Sex (2019 est.)



2019 Median Age: 39.8

2010 Median Age: 48.6

2000 Median Age: 43.8

Source: U.S. Census Bureau, 2019. Compiled by CUPPAD Regional Commission, 2021.

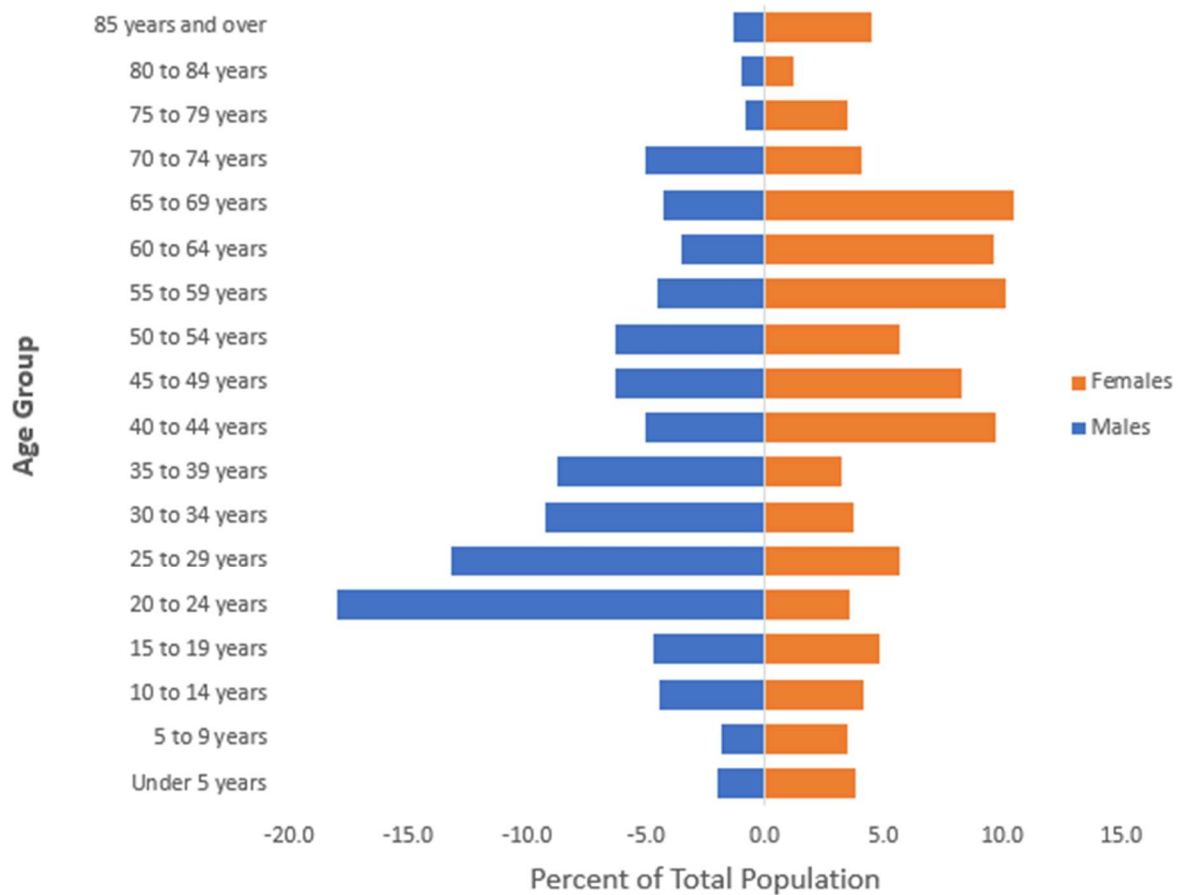
Munising Township: T44N, 45N, 46N, 47N & 48N - R17W, 18W & 19W

Office location	East 9630 Prospect Street Wetmore, MI 49895
Mailing address	PO Box 190 Wetmore, MI 49895
Phone	906.387.4404
Total Area*	217.7 square miles (202.6 land) 139,328.0 acres (129,664.0 land)
Population (2019)	2,865
Housing Units (2019)	1,225 (392 for seasonal, recreational or occasional use)
Total Households (2019)	603
Average Household Size (2019)	3.27 persons
Fire Department	Munising Township Volunteer Fire Dept.
Police Department	Alger County Sheriff
School District(s)	Munising Public Schools
State Equalized Valuation (Residential) (2021)	\$ 80,801,200

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021

Munising Township is the most populous local jurisdiction in the county. Two-thirds of its land area is within the Hiawatha National Forest or Lake Superior State Forest. About 20 percent of the land area is designated as commercial forest reserve, most of which is owned by Lyme Great Lakes Timberlands. Highway M-28 is the busiest and most important roadway. Federal Forest Highway 13 and H-58 are vital to the transportation network. The township extends about 20 miles south from the city of Munising and is 3 to 15 miles wide. Many lakes are within the Hiawatha National Forest. Development is concentrated in and around Wetmore near the intersection of FFH13 and M-28. Alger Correctional Facility and Timber Products Michigan, two of the largest area employers, are found in the township. A large part of the Pictured Rocks National Lakeshore is in the township. About 30% of all housing units are limited to seasonal or occasional use.

Munising Township Population by Age & Sex (2019 est.)



2019 Median Age: 38.7

2010 Median Age: 40.4

2000 Median Age: 35.2

Source: U.S. Census Bureau, 2019. Compiled by CUPPAD Regional Commission, 2021.

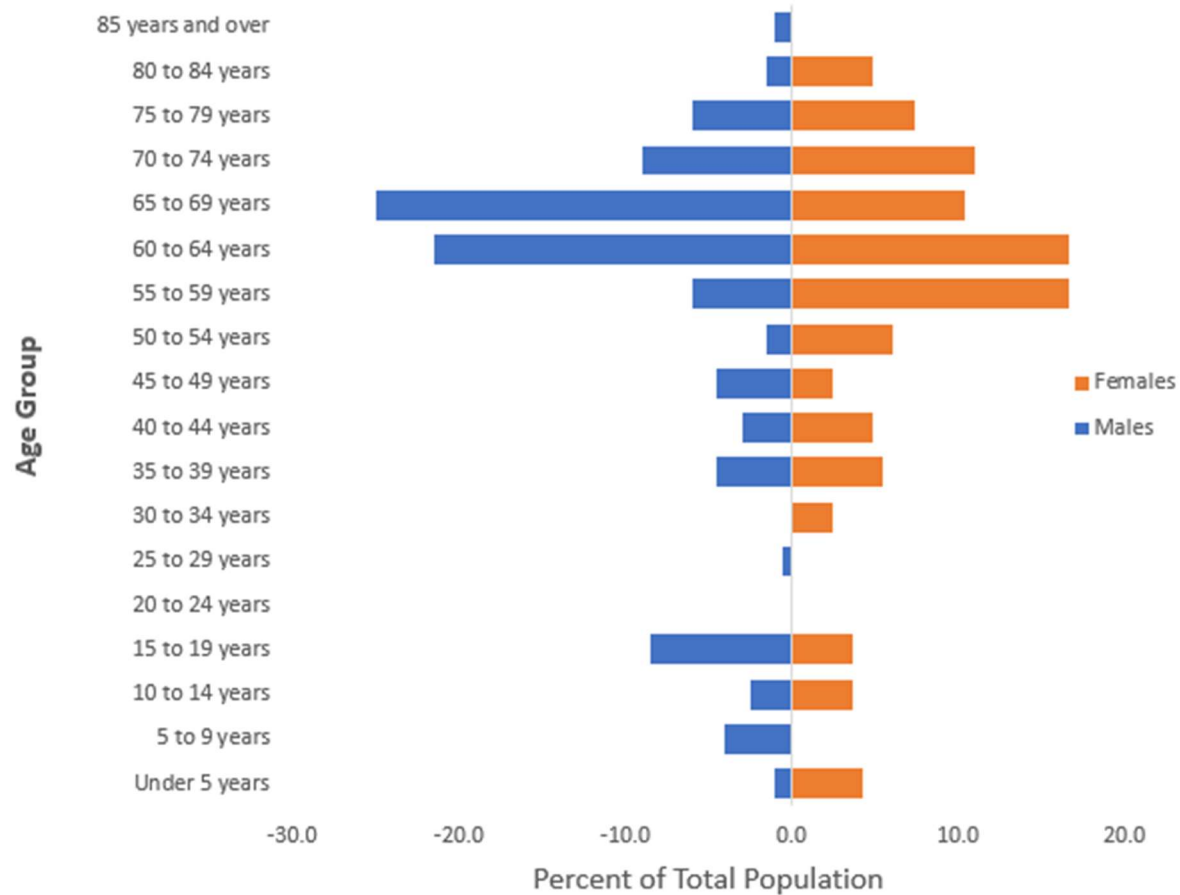
Onota Township: T46N, 47N & 48N - R21W & 22W

Office location	E1461 Deerton-Sand Lake Road Deerton, MI 49822
Mailing address	P.O. Box 100 Deerton, MI 49822
Phone	906.343.6535
Total Area*	96.13 square miles (87.99 land) 61,523.2 acres (56,313.6 land)
Population (2019)	371
Housing Units (2019)	407 (220 for seasonal, recreational or occasional use)
Total Households (2019)	153
Average Household Size (2019)	2.37 persons
Fire Department	Onota Township Volunteer Fire Department
Police Department	Alger County Sheriff
School District(s)	Au Train-Onota Schools
State Equalized Valuation (Residential) (2021)	\$ 48,537,000

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021

Onota Township is bordered on the west by Marquette County with Lake Superior forming its entire northern boundary. It extends 12 miles east-west at its widest point and from 3-to10 miles north-south. Highway M-28 is the principal roadway with most development found along or near its route. About 30 percent of the land area is within the Hiawatha National Forest and a similar amount designated as commercial forest reserve. The greatest concentration of residential units is found at waterfront locations. Only a few commercial establishments are found in the township. Approximately fifty-four percent of township housing units are not used as primary residences.

Onota Township Population by Age & Sex (2019 est.)



2019 Median Age: 61.5
2010 Median Age: 56.6
2000 Median Age: 49.8

Source: U.S. Census Bureau, 2019. Compiled by CUPPAD Regional Commission, 2021.

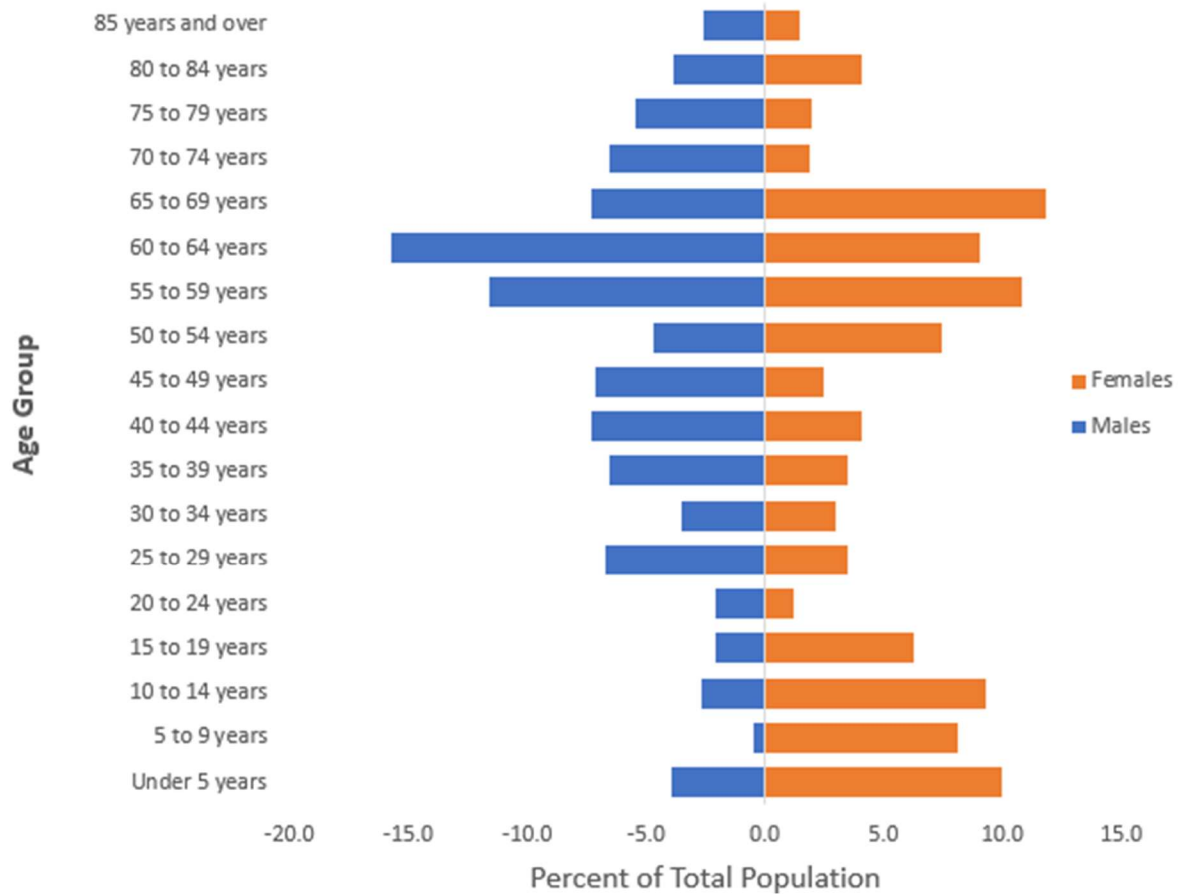
Rock River Township: T45N & 46N - R21W & 22W

Office location	E3667 State Road 94 Chatham, MI 49816
Mailing address	P.O. 195 Chatham, MI 49816
Phone	906.439.5360
Total Area*	81.01 square miles (80.93 land) 51,846.4 acres (51,795.2 land)
Population (2019)	1,231
Housing Units (2019)	653 (137 for seasonal, recreational or occasional use)
Total Households (2019)	482
Average Household Size (2019)	2.58 persons
Fire Department	Rock River Township VFD
Police Department	Alger County Sheriff
School District(s)	Superior Central School District
State Equalized Valuation (Residential) (2021)	\$ 41,403,800 (includes Village of Chatham)

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021

Rock River Township extends for 12 miles at its widest point and 7 miles north-south. Highways M-94 and M-67 intersect in Chatham and are the principal roadways. Most development is found on or near these highways. County road H-01 is the most important county road in the township. About 13 percent of township land area is publicly owned. Commercial forest reserve land - mostly Lyme Great Lakes- makes up about 16 percent of the total area of the township. The village of Chatham is within the township and is its commercial center. Eben Junction, at the H-01/M-94 intersection, is a small commercial center as well. About 20 percent of the township's housing stock is used for seasonal or recreational purposes.

Rock River Township Population by Age & Sex (2019 est.)



2019 Median Age: 50.9

2010 Median Age: 46.0

2000 Median Age: 42.3

Source: U.S. Census Bureau, 2019. Compiled by CUPPAD Regional Commission, 2021.

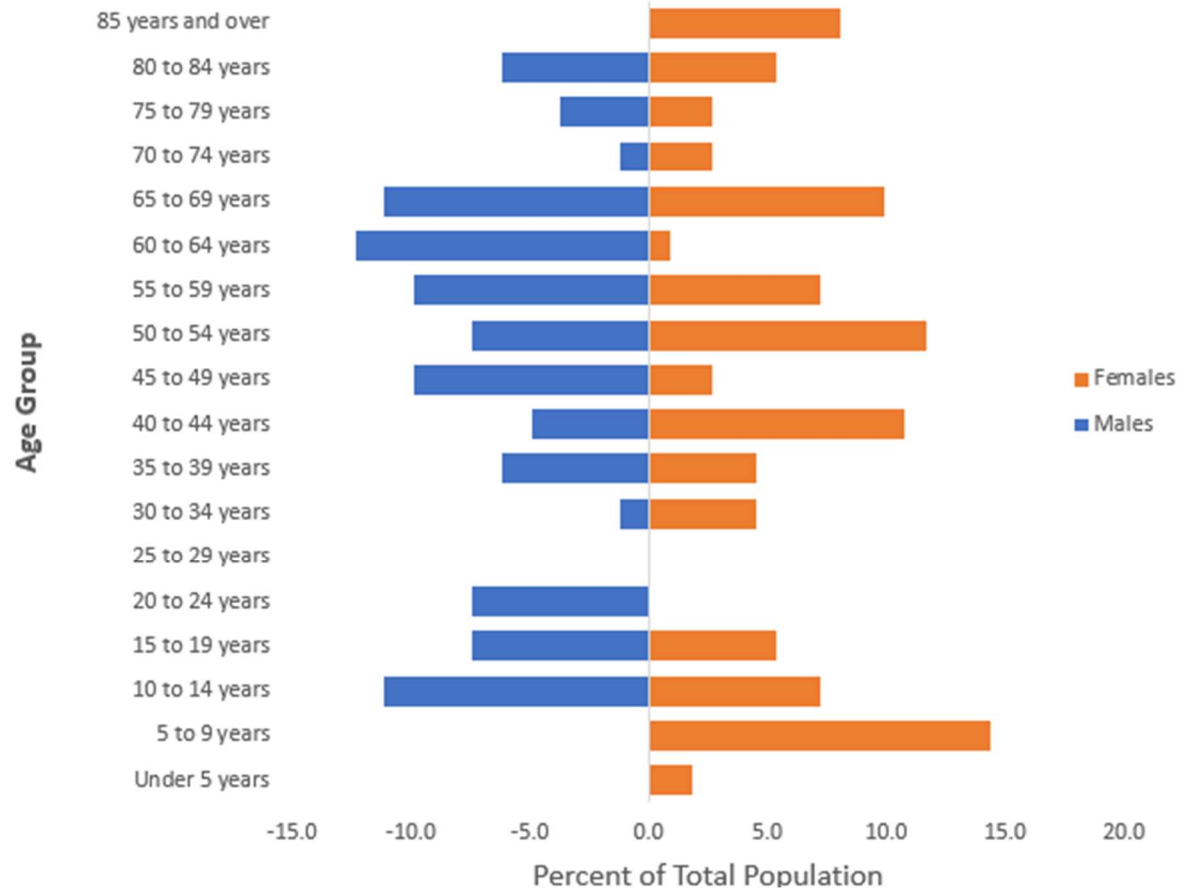
Village of Chatham: T45N & 46N - R21W

Office location	E3751 Munising Street Chatham, MI 49816
Mailing address	P.O. Box 167 Chatham, MI 49816
Phone	906.439.5608
Total Area*	2.65 square miles (2.64 land) 1,696 acres (1,689.6 land)
Population (2019)	193
Housing Units (2020)	104 (13 for seasonal, recreational or occasional use)
Total Households (2019)	90
Average Household Size (2019)	2.13 persons
Fire Department	Rock River Twp. VFD
Police Department	Alger County Sheriff
School District(s)	Superior Central School District
State Equalized Valuation (Residential) (2021)	\$ (included in Rock River twp. S.E.V.)

Source: U.S. Census Bureau and Michigan Department of Treasury, 2021

Chatham incorporated as a village in 1964 to allow financing of a public water supply system. The village water system was constructed in 1969 and included a 50,000 elevated storage tank, 265-foot deep well, pumping equipment and service lines. There are currently 96 service connections within the village and 47 in adjacent Eben. Two sewage lagoons, two seepage cells, and two lift stations comprise the village wastewater system that currently connects to 71 homes and businesses. The existing system was completed in 1975. Highway M-94 winds through the center of the village and is its major road. Highway M-67 intersects with M-94 near the southern boundary. Agricultural research facilities of Michigan State University take in about 30 percent of the village land area.

Village of Chatham Population by Age & Sex (2019 est.)



2019 Median Age: 49.0
2010 Median Age: 44.3
2000 Median Age: 40.8

Source: U.S. Census Bureau, 2019. Compiled by CUPPAD Regional Commission, 2021.

APPENDIX B

Historic Sites – Alger County

Historic Sites, Alger County		
Name	Location	Historic Significance
American Fur Company Log Cabin No. 3	Elm and Varum Streets, Munising	This structure was one of four used by the American Fur Company dating back to 1840. It was moved from Grand Island to Munising in 1971 and restored. It was designated as a state historic site in February 1981.
Bay Furnace	northwest of Christmas, Au Train township	First operated in 1870, this charcoal kiln produced as much as 15 tons of pig iron daily and is an important reminder of the early iron industry. The site gained listing on the state register in January 1971 and the national register in September 1971.
Big Sable Light Station	7 miles west of Grand Marais, Burt township	This lighthouse became operational in 1874. It is now part of the Pictured Rocks National Lakeshore. It was added to the state historic register in September 1976 and to the national register in May 1978.
Bird-Olivier House	Everett Avenue and Emma Street, Grand Marais	This residence was one of the earliest frame homes constructed in Grand Marais circa 1883. It was designated as a state historic site in April 1981.
Burt and Gamble Railway Grade	2.5 miles east of Grand Marais, Burt township	Lumbermen Wellington Burt and Henry Gamble built this narrow gauge line to haul logs in about 1879. It was abandoned in 1888 and the rails were removed in 1898. It was added to the state register in November 1976.
Cook, Curtis and Miller Sawmill	East Everett Road (H-58), Burt township	This sawmill was the last of the large mills in the area. It closed for good in 1919 despite losing rail service in 1910. State register listing occurred in February 1989.
Munising City Hall	100 West Munising Avenue, Munising	This former bank building was constructed in 1896 and is noted for its architecture. It was listed on the state register in February 1980.
Grand Island	Munising Bay, Lake Superior, Grand Island township	The island was the site of early trading posts and settlement. It was registered as a state historic site in February 1959.
Grand Island Harbor Rear Range Light	west of Powell Point, Grand Island township	This steel tower was constructed in 1913 as a navigational aid and operated until 1969. It was

Historic Sites, Alger County		
Name	Location	Historic Significance
American Fur Company Log Cabin No. 3	Elm and Varnum Streets, Munising	This structure was one of four used by the American Fur Company dating back to 1840. It was moved from Grand Island to Munising in 1971 and restored. It was designated as a state historic site in February 1981.
		listed on the national register in June 1990.
Grand Island North Light Station	North Point, Grand Island	This structure was built in 1867 and operated until 1961. It was added to the national register in September 1985.
Grand Marais Post Office Building	Grand Marais Avenue at Randolph Street, Grand Marais	Constructed in 1905, this frame structure is one of the oldest post office buildings in the state. It was listed on the state register in January 1978.
Lake Superior Informational Designation	roadside park, M-28, Au Train township	A marker was erected at this site in April 1957 to acknowledge the importance of Lake Superior as a transportation route for early explorers and present day commerce. State historic listing occurred in January 1957.
Lobb House	203 Onota Street, Munising	Constructed in 1905-1906 for the prominent Lobb family, this structure is noted for architectural design. It was added to the state register in December 1973 and to the national register in October 1976. A marker was erected at the home in April 1980.
Mikulich General Store	intersection of county roads H-01 and H-44 in Traunik, Limestone township	The structure was built in 1922-1923 and is noted for its role as the social and economic center of a large Slovenian community. It was added to the state and federal registers in October 1987 and July 1993 respectively. A marker was placed at the site in November 1994.
Pacific Hotel	100 Rock River Road (M-94), Chatham	Also known as the Chatham Hotel, this building was constructed in 1904 of locally-quarried sandstone. It is closely associated with area historic events from the time it was built and was added to the state register in June 1985.
Paulson House	south of Au Train on USFS 2278, Hiawatha National Forest, Au	Completed in 1883, this log house is an example of the early homes of the area. The site is identified by a marker that was erected in August 1972. It was

Historic Sites, Alger County		
Name	Location	Historic Significance
American Fur Company Log Cabin No. 3	Elm and Varnum Streets, Munising	This structure was one of four used by the American Fur Company dating back to 1840. It was moved from Grand Island to Munising in 1971 and restored. It was designated as a state historic site in February 1981.
	Train township	added to the state register in February 1972 and to the national register in November 1972.
Pictured Rocks	Lake Superior shoreline, 2 miles east of Munising, Munising township	This site is known for its beautiful sandstone formations. It was listed on the state register in February 1965.
Schoolcraft Furnace Site	near Munising Falls Creek, Pictured Rocks National Lakeshore, Munising	This was one of the most significant blast furnaces in upper Michigan. It was designated as a national historic site in December 1977.

APPENDIX C

Hazard Risk Analysis

HAZARD RISK ANALYSIS

Hazards of all types were evaluated based primarily on the probability of an occurrence and severity of impact. Local residents from business and industry, police and fire agencies, emergency services, education, public health, medical services, transportation, planning and zoning, and local elected officials participated in a series of reviews and discussions. Hazards were ranked according to aspects and values determined by local evaluators. In all, some two-dozen residents participated directly in the process.

Generally, hazards of all types were evaluated according to **probability of future occurrence**, **impact** (overall effect on community), and **extent** (magnitude of impact). Specifically, six measures, each with a weighted value, were used in the hazard risk assessment rating and are as follows:

1.	Likelihood of Occurrence	-	30%
2.	Percent of Population Affected	-	20%
3.	Casualty Potential	-	20%
4.	Economic Effect	-	20%
5.	Environmental Impact	-	5%
6.	Corollary Effects	-	5%

The likelihood of a particular hazard occurring is based on Alger County incidents to the extent that such information is available. Regional, state, and national data were used throughout. The impacted population was rated based on known and potential incident locations in relation to current census data. Direct and indirect impacts were considered. Injury and death potential were considered based on available county information and also state and national sources. Economic, environmental and corollary effects were determined by known conditions, as well as anticipated future conditions.

The sum of rating points from each of the six hazard aspects reflects an order of importance as a threat within the county. While this ranking is useful for planning purposes and is based on the most current information available and many hours of deliberation, it should not be assumed that lower ranked hazards will not occur. Most hazard events are extremely difficult to predict.

Rankings were updated in 2020 through quantitative analysis and LEPC discussions reflect current community concerns and incidents since approval of the original plan. The table below summarizes the original information.

ALGER COUNTY HAZARD RATING			
Hazard	Rating Score	Original Ranking	Risk
Ice & Sleet Storms	8.05	1	HIGH
Temperature Extremes	7.50	2	
Snowstorms	7.45	3	
Infrastructure Failures	6.60	4	
Drought	6.30	5	
Severe Wind	6.10	6	
Structural Fires	5.85	7	
Public Health Emergencies	5.65	8	MODERATE
Wildfires	5.40	9	
Tornadoes	5.40	9	
Economic Recession/Adversity	5.25	11	
Public Assembly Events	5.05	12	
Transportation Accidents	5.00	13	
Lightning & Thunderstorms	4.85	14	
Other Environmental (invasive, exotic, diseases, etc.)	4.75	15	
Riverine Flooding	4.35	16	
Hail	4.35	16	
Hazardous Materials Accidents - Transportation	4.35	16	
Terrorism, Sabotage, WMD	3.95	19	LOW
Hazardous Materials Accidents - Fixed Site	3.55	20	
Bioterrorism	3.50	21	
Great Lakes Flooding	3.15	22	
Dam Failures	3.10	23	
Civil Disturbance	2.55	24	
School Violence	1.80	25	
Workplace Violence	1.80	25	
Scrap Tire Fires	1.40	27	
Petroleum Pipeline Failures	1.35	28	
Urban Flooding	1.00	29	
Earthquakes	1.00	29	
Nuclear Power Plant Accidents	1.00	29	
Subsidence	1.00	29	

2007 RATING TABLE - COUNTY: <u>ALGER</u> Indicate likelihood from 1-10 with 10 representing the greatest potential								
Hazard	Likelihood of Occurrence (30%)	% Population affected (20%)	Casualty Potential (20%)	Economic Impact (20%)	Environmental Impact (5%)	Corollary Effects (5%)	Total Rating Score	Rank
1 – Wildfires	10	2	2	4	8	8	5.40	9*
2 - Riverine Flooding	8	2	1	4	6	5	4.35	16*
3 - Great Lakes Flooding	4	2	1	4	6	5	3.15	22
4 - Urban Flooding	1	1	1	1	1	1	1.00	29*
5 – Tornadoes	8	4	4	4	6	6	5.40	9*
6 - Severe Wind	10	10	2	2	2	4	6.10	6
7 - Lightning & Thunderstorms	10	4	2	2	1	4	4.85	14
8 – Hail	8	4	1	4	1	2	4.35	16*
9 – Snowstorms	10	10	1	8	5	8	7.45	3
10- Ice & Sleet Storms	10	10	10	4	1	4	8.05	1
11- Temperature Extremes	10	10	4	6	2	8	7.50	2
12- Drought	8	8	1	8	4	6	6.30	5
13- Earthquakes	1	1	1	1	1	1	1.00	29*
14- Other Environmental (invasive, exotics, diseases, etc.)	8	2	1	5	10	5	4.75	15
15- Infrastructure Failures	10	6	2	6	8	8	6.60	4
16- Structural Fires	10	1	5	6	4	5	5.85	7
17- Dam Failures	2	2	2	6	5	5	3.10	23

2007 RATING TABLE - COUNTY: <u>ALGER</u> Indicate likelihood from 1-10 with 10 representing the greatest potential								
Hazard	Likelihood of Occurrence (30%)	% Population affected (20%)	Casualty Potential (20%)	Economic Impact (20%)	Environmental Impact (5%)	Corollary Effects (5%)	Total Rating Score	Rank
18 – Nuclear Power Plant Accidents	1	1	1	1	1	1	1.00	29
19- Subsidence	1	1	1	1	1	1	1.0	29*
20- Scrap Tire Fires	1	1	1	1	8	2	1.40	27
21- Hazardous Materials Accident - Fixed Site	6	1	2	2	10	5	3.55	20
22- Hazardous Materials Accident - Transportation	8	2	2	2	10	5	4.35	16*
23- Petroleum Pipeline Failures	1	1	1	1	1	8	1.35	28
24- Civil Disturbance	4	2	2	2	1	2	2.55	24
25- Terrorism, Sabotage, WMD	1	8	2	5	5	8	3.95	19
26- Bioterrorism	1	6	2	4	8	8	3.50	21
27- Public Assembly Events	10	4	4	1	1	4	5.05	12
28- School Violence	1	1	4	1	1	5	1.8	25*
29- Workplace Violence	1	1	4	1	1	5	1.8	25*
30- Public Health Emergencies	8	1	1	6	1	8	5.65	8
31- Economic Recession/Adversity	1	10	1	10	5	10	5.25	11
32- Transportation Accidents	10	1	4	4	2	2	5.00	13

* indicates another hazard(s) with identical rating

APPENDIX D

ALGER COUNTY HIGH RISK EROSION PARCELS FOR:

Burt Township

Burt Township (arranged west to east)			
Sequence Number	Property Number	60-Year Projected Recession Distance	30-Year Projected Recession Distance
A1	02-002-450-031-00	660 feet	340 feet
A1	02-002-450-033-00	660 feet	340 feet
A1	02-002-450-034-05	660 feet	340 feet
A1	02-002-450-022-00	660 feet	340 feet
A1	02-002-452-047-00	660 feet	340 feet
A1	02-002-450-034-10	660 feet	340 feet
A1	02-002-450-021-00	660 feet	340 feet
A1	02-002-450-034-00	660 feet	340 feet
A1	02-002-450-020-00	660 feet	340 feet
A1	02-002-450-019-00	660 feet	340 feet
A2	02-002-450-018-00	895 feet	455 feet
A2	02-002-450-017-00	895 feet	455 feet

Burt Township (arranged west to east)			
Sequence Number	Property Number	60-Year Projected Recession Distance	30-Year Projected Recession Distance
A2	02-002-452-048-00	895 feet	455 feet
A2	02-002-452-035-00	895 feet	455 feet
A2	02-002-450-016-00	895 feet	455 feet
A2	02-002-450-015-00	895 feet	455 feet
A2	02-002-452-050-00	895 feet	455 feet
A2	02-002-452-049-00	895 feet	455 feet
A2	02-002-450-014-00	895 feet	455 feet
A2	02-002-450-013-00	895 feet	455 feet
A2	02-002-452-051-00	895 feet	455 feet
A2	02-002-452-067-00	895 feet	455 feet
A2	02-002-452-084-00	895 feet	455 feet
A2	02-002-450-012-00	895 feet	455 feet
A2	02-002-452-068-00	895 feet	455 feet

Burt Township (arranged west to east)			
Sequence Number	Property Number	60-Year Projected Recession Distance	30-Year Projected Recession Distance
A2	02-002-450-011-10	895 feet	455 feet
A2	02-002-452-069-00	895 feet	455 feet
A2	02-002-452-082-00	895 feet	455 feet
A2	02-002-450-011-00	895 feet	455 feet
A2	02-002-452-052-00	895 feet	455 feet
A2	02-002-452-070-00	895 feet	455 feet
A2	02-002-452-081-00	895 feet	455 feet
A2	02-002-450-010-00	895 feet	455 feet
A2	02-002-452-053-00	895 feet	455 feet
A2	02-002-452-066-00	895 feet	455 feet
A2	02-002-452-071-00	895 feet	455 feet
A2	02-002-452-080-00	895 feet	455 feet
A2	02-002-450-009-00	895 feet	455 feet
A2	02-002-452-054-00	895 feet	455 feet
A2	02-002-452-065-00	895 feet	455 feet

Burt Township (arranged west to east)			
Sequence Number	Property Number	60-Year Projected Recession Distance	30-Year Projected Recession Distance
A2	02-002-452-072-00	895 feet	455 feet
A2	02-002-450-008-00	895 feet	455 feet
A2	02-002-452-064-00	895 feet	455 feet
A3	02-002-452-073-00	1040 feet	525 feet
A3	02-002-450-007-00	1040 feet	525 feet
A3	02-002-452-055-00	1040 feet	525 feet
A3	02-002-452-063-00	1040 feet	525 feet
A3	02-002-452-074-00	1040 feet	525 feet
A3	02-002-452-077-00	1040 feet	525 feet
A3	02-002-450-004-00	1040 feet	525 feet
A3	02-002-452-056-00	1040 feet	525 feet
A3	02-002-452-057-00	1040 feet	525 feet
A3	02-002-452-062-00	1040 feet	525 feet
A3	02-002-452-061-00	1040 feet	525 feet
A3	02-002-452-075-00	1040 feet	525 feet
A3	02-002-452-076-00	1040 feet	525 feet
A3	02-002-450-001-00 lots 2, 3	1040 feet	525 feet
A3	02-002-452-058-00	1040 feet	525 feet
A3	02-002-452-059-00	1040 feet	525 feet
A3	02-002-452-060-00	1040 feet	525 feet

Burt Township (arranged west to east)			
Sequence Number	Property Number	60-Year Projected Recession Distance	30-Year Projected Recession Distance
A3	02-002-104-002-20	1040 feet	525 feet
A4	02-002-450-001-00 lot 1	955 feet	485 feet
A4	02-002-233-001-20	955 feet	485 feet
A4	02-002-233-001-00	955 feet	485 feet
A5	02-002-233-001-10	750 feet	380 feet
A6	02-002-233-001-30	460 feet	240 feet
A7	02-002-234-002-20	365 feet	190 feet
A7	02-002-234-002-10	365 feet	190 feet
A8	02-002-234-002-00	165 feet	90 feet
A8	02-002-234-007-50	165 feet	90 feet
A8	02-002-234-001-00 western 700 feet	165 feet	90 feet
A9	02-002-234-001-00 eastern 650 feet	300 feet	160 feet
A9	02-002-234-006-10 western 250 feet	300 feet	160 feet
A10	02-002-234-006-10 eastern 400 feet	610 feet	310 feet

Burt Township (arranged west to east)			
Sequence Number	Property Number	60-Year Projected Recession Distance	30-Year Projected Recession Distance
A10	02-002-234-006-20	610 feet	310 feet
A11	02-002-234-006-30	400 feet	205 feet
A11	02-002-234-006-50	400 feet	205 feet
A11	02-002-234-006-60	400 feet	205 feet
A11	02-002-234-006-00	400 feet	205 feet
A11	02-002-234-006-43	400 feet	205 feet
A11	02-002-234-006-40	400 feet	205 feet
A12	02-002-234-006-42	480 feet	250 feet
A12	02-002-235-001-00 western 750 feet	480 feet	250 feet
A13	02-002-235-001-00 adjacent western 800 feet	315 feet	165 feet
A14	02-002-235-001-00 adjacent western 950 feet	130 feet	70 feet

APPENDIX E

ALGER COUNTY National Centers for Environmental Information Storm Events

Table 1 64 Hail Events in Alger County 1950 – 2020 (NCEI)							
	Location or County	Date	Magnitude	Death	Injury	Property Damage	Crop Damage
1	Alger	6/01/68	0.75 in.	0	0	0	0
2	Alger	07/19/78	3.50 in.	0	0	0	0
3	Alger	7/13/82	0.75 in.	0	0	0	0
4	Alger	7/4/86	1.00 in.	0	0	0	0
5	Alger	6/19/88	0.75 in.	0	0	0	0
6	Alger	7/15/88	0.75 in.	0	0	0	0
7	Alger	6/27/91	0.75 in.	0	0	0	0
8	Alger	7/19/92	0.75 in.	0	0	0	0
9	Alger	7/19/92	0.75 in.	0	0	0	0
10	Eben Junction	4/26/94	0.75 in.	0	0	0	0
11	Munising	10/19/95	0.75 in.	0	0	0	0
12	Wetmore	7/8/96	0.75 in.	0	0	0	0
13	Trenary	7/2/97	0.75 in.	0	0	0	0
14	Sand River	7/17/97	1.50 in.	0	0	5K	0
15	Trenary	6/10/00	0.75 in.	0	0	0	0
16	Au Train	8/1/00	0.75 in.	0	0	0	0
17	Au Train	5/10/01	1.25 in.	0	0	0	0
18	Chatham	5/10/01	1.00 in.	0	0	0	0
19	Au Train	5/10/01	0.75 in.	0	0	0	0
20	Wetmore	5/10/01	1.75 in.	0	0	0	0
21	Grand Marais	5/15/01	0.75 in.	0	0	0	0
22	Grand Marais	5/17/01	0.75 in.	0	0	0	0
23	Kiva	6/27/01	0.75 in.	0	0	0	0
24	Trenary	6/27/01	1.00 in.	0	0	0	0
25	Trenary	4/18/04	0.75 in.	0	0	0	0
26	Trenary	6/30/04	1.00 in.	0	0	0	0
27	Melstrand	6/18/06	0.75 in.	0	0	0	0
28	Au Train	6/21/06	0.75 in.	0	0	0	0
29	Munising	7/01/06	0.75 in.	0	0	0	0
30	Sand River	5/14/07	0.75 in.	0	0	0	0
31	Chatham	6/20/07	0.88 in.	0	0	0	0
32	Sundell	7/08/07	1.00 in.	0	0	0	0
33	Grand Marais	6/14/08	0.75 in.	0	0	0	0
34	Trenary	6/28/08	1.00 in.	0	0	0	0
35	Christmas	5/07/09	0.75 in.	0	0	0	0
36	Wetmore	5/07/09	0.88 in.	0	0	0	0
37	Munising	5/07/09	0.88 in.	0	0	0	0
38	Grand Marais	6/09/10	0.88 in.	0	0	0	0
39	Melstrand	6/08/11	1.25 in.	0	0	0	0
40	Grand Marais	6/08/11	1.75 in.	0	0	0	0
41	Shingleton	6/08/11	1.75 in.	0	0	0	0
42	Winters	6/08/11	0.75 in.	0	0	0	0
43	Melstrand	7/31/13	1.00 in.	0	0	0	0
44	Au Train	8/21/13	0.75 in.	0	0	0	0
45	Grand Marais	8/21/13	1.00 in.	0	0	0	0
46	Chatham	8/21/13	1.25 in.	0	0	0	0

47	Chatham	8/21/13	0.75 in.	0	0	0	0
48	Eben Junction	8/21/13	1.00 in.	0	0	0	0
49	Trenary	8/21/13	1.00 in.	0	0	0	0
50	Winters	8/21/13	1.00 in.	0	0	0	0
51	Diffin	8/2/15	1.50 in.	0	0	0	0
52	Grand Marais	7/26/16	0.75 in.	0	0	0	0
53	Grand Marais	7/26/16	1.25 in.	0	0	0	0
54	Grand Marais	7/26/16	0.75 in.	0	0	0	0
55	Grand Marais	7/26/16	0.75 in.	0	0	0	0
56	Christmas	6/15/17	1.50 in.	0	0	0	0
57	Munising	6/15/17	1.00 in.	0	0	0	0
58	Munising	6/15/17	1.75 in.	0	0	0	0
59	Shingleton	6/15/17	0.88 in.	0	0	0	0
60	Shingleton	6/15/17	1.00 in.	0	0	0	0
61	Trenary	8/9/17	1.50 in.	0	0	0	0
62	Trenary	8/9/17	1.50 in.	0	0	0	0
63	Deerton	6/30/18	0.75 in.	0	0	0	0
64	Munising	9/26/20	1.00 in.	0	0	0	0
Total				0	0	5K	0

Table 2 7 Tornado Events in Alger County 1950 – 2020 (NCEI)							
	Location or County	Date	Magnitude	Death	Injury	Property Damage	Crop Damage
1	Alger	7/06/53	F0	0	0	3K	0
2	Alger	6/29/58	F0	0	0	3K	0
3	Alger	5/06/64	F2	0	0	250K	0
4	Alger	7/09/87	F1	0	0	OK	0
5	Alger	7/19/92	F0	0	0	OK	0
6	Shingleton	7/21/02	N/A	0	0	0	0
7	Christmas	7/28/05	F0	0	0	0	0
Total				0	0	\$255K	0

Table 3 69 Thunderstorm & High Wind Events in Alger County 1950 – 2020 (NCEI)							
	Location or County	Date	Magnitude	Death	Injury	Property Damage	Crop Damage
1	Alger	6/07/68	0 knots	0	0	0	0
2	Alger	7/28/80	60 knots	0	0	0	0
3	Alger	9/06/83	51 knots	0	0	0	0
4	Alger	7/15/88	0 knots	0	0	0	0
5	Alger	8/16/88	72 knots	0	0	0	0
6	Alger	8/16/88	0 knots	0	1	0	0
7	Alger	8/02/89	0 knots	0	0	0	0
8	Lower	5/24/93	0 knots	0	0	50K	0
9	Munising	8/19/93	N/A	0	0	0	0

Table 3 69 Thunderstorm & High Wind Events in Alger County 1950 – 2020 (NCEI)							
	Location or County	Date	Magnitude	Death	Injury	Property Damage	Crop Damage
10	Eastern Upper	10/21/93	65 knots	0	0	0	0
11	Munising	7/13/95	N/A	0	0	0	0
12	Grand Marais	7/16/97	55 knots	0	0	0	0
13	Melstrand	8/24/98	50 knots	0	0	0	0
14	Alger & other counties	11/10/98	76 knots	0	0	450K	10.0M
15	Munising	7/05/99	58 knots	0	1	0	0
16	Alger & Other Counties	10/22/99	67 knots	0	0	21K	2K
17	Alger & Other Counties	12/25/99	59 knots	0	0	50K	0
18	Trenary	6/10/00	60 knots	0	0	100K	0
19	Munising	5/17/01	65 knots	0	0	0	0
20	Kiva	6/27/01	60 knots	0	0	0	0
21	Munising	8/08/01	55 knots	0	0	0	0
22	Au Train	4/18/02	60 knots	0	0	0	0
23	Munising	7/21/02	55 knots	0	0	0	0
24	Shingleton	7/21/02	60 knots	0	0	0	0
25	Munising	7/31/02	55 knots	0	0	0	0
26	Shingleton	7/31/02	65 knots	0	0	0	0
27	Wetmore	8/01/02	60 knots	0	0	0	0
28	Trenary	8/09/05	75 knots	0	0	0	0
29	Munising	8/09/05	60 knots	0	0	0	0
30	Trenary	8/9/05	80 knots	0	0	0	0
31	Grand Marais	7/16/06	55 knots	0	0	4K	0
32	Grand Marais	7/17/06	60 knots	0	0	5K	0
33	Chatham	7/30/06	50 knots	0	0	0	0
34	Munising	6/18/07	50 knots	0	0	0	0
35	Alger & Other Counties	9/19/07	50 knots	0	0	0	0
36	Alger & Other Counties	11/6/07	50 knots	0	0	0	0
37	Alger & Other Counties	11/27/07	60 knots	0	0	30K	0
38	Grand Marais	6/09/10	60 knots	0	0	0	0
39	Alger & Other Counties	9/03/10	55 knots	0	0	0	0
40	Alger & Other Counties	10/26/10	56 knots	0	0	2K	0
41	Alger & Other Counties	2/18/11	56 knots	0	0	5K	0
42	Au Train	5/31/11	55 knots	0	0	2K	0
43	Grand Marais	6/04/11	52 knots	0	0	0	0
44	Munising	6/08/11	55 knots	0	0	0	0
45	Alger & Other Counties	9/29/11	60 knots	0	0	10K	0

Table 3 69 Thunderstorm & High Wind Events in Alger County 1950 – 2020 (NCEI)							
	Location or County	Date	Magnitude	Death	Injury	Property Damage	Crop Damage
46	Alger & Other Counties	10/15/11	56 knots	0	0	0	0
47	Alger & Other Counties	10/16/11	52 knots	0	0	0	0
48	Alger & Other Counties	10/16/11	55 knots	0	0	0	0
49	Au Train	7/05/12	55 knots	0	0	4K	0
50	Forest Lake	7/05/12	55 knots	0	0	1K	0
51	Kiva	7/29/12	70 knots	0	0	15K	0
52	Grand Marais	7/30/12	51 knots	0	0	0	0
53	Shingleton	9/03/12	50 knots	0	0	1K	0
54	Wetmore	9/03/12	50 knots	0	0	2K	0
55	Melstrand	7/22/13	60 knots	0	0	15k	0
56	Alger & Other Counties	11/18/13	56 knots	0	0	0	0
57	Alger & Other Counties	9/19/14	50 knots	0	0	0	0
58	Alger & Other Counties	12/24/15	50 knots	0	0	5k	0
59	Munising	10/17/16	61 knots	0	0	1.5k	0
60	Au Train	10/17/16	61 knots	0	0	2k	0
61	Grand Marais	6/15/17	51 knots	0	0	0	0
62	Sand River	7/18/17	50 knots	0	0	0	0
63	Onola	8/1/17	70 knots	0	0	70k	0
64	Alger & Other Counties	10/24/17	52 knots	0	0	20k	0
65	Winters	7/1/18	55 knots	0	0	2k	0
66	Alger & Other Counties	3/13/20	54 knots	0	0	0	0
67	Alger & Other Counties	9/3/20	50 knots	0	0	1k	0
68	Alger & Other Counties	9/6/20	51 knots	0	0	0	0
69	Alger & Other Counties	11/1/20	58 knots	0	0	0	0
Total				0	2	868.5K	10.002M

Table 4 2 Temperature Extreme Events 1950 – 2013 (NCDC)							
	Location or County	Date	Type	Death	Injury	Property Damage	Crop Damage
1	Alger & other counties	2/03/96	Extreme Cold	0	0	0	0
2	Alger & other	2/04/96	Extreme	0	0	0	0

	counties		Cold				
3	Alger & other counties	1/5/14	Extreme cold	0	0	0	0
Total				0	0	0	0

Table 5 3 Lightning Events 1950 – 2020 (NCEI)							
	Location or County	Date	Type	Death	Injury	Property Damage	Crop Damage
1	Shingleton	6/29/98	Lightning	1	0	0	0
2	Munising	7/14/06	Lightning	0	3	0	0
3	Grand Marais	9/30/19	Lightning	0	0	20k	0
Total				1	3	20k	0

Table 6 233 Snow and Ice Events 1950 – 2020 (NCEI)						
	Date	Type	Death	Injury	Property Damage	Crop Damage
1	1/12/93	Heavy Snow	0	0	50K	0
2	2/22/93	Lake Effect Snow	0	0	0	0
3	3/10/93	Heavy Snow	0	0	0	0
4	3/23/93	Freezing Rain	0	0	0	0
5	10/29/93	Heavy Snow	0	0	0	0
6	11/4/93	Heavy Snow	0	0	0	0
7	12/10/93	Heavy Snow	0	0	0	0
8	12/20/93	Heavy Snow	0	0	0	0
9	12/23/93	Heavy Snow	0	0	0	0
10	12/25/93	Heavy Snow	0	0	0	0
11	12/29/93	Heavy Snow	0	0	0	0
12	1/27/94	Heavy Snow/Freezing Rain	0	0	5.0M	0
13	3/21/94	Heavy Snow	0	0	0	0
14	3/22/94	Heavy Snow	0	0	0	0
15	1/20/95	Heavy Snow	0	0	0	0
16	3/4/95	Heavy Snow	0	0	0	0
17	3/06/95	Heavy Snow	0	0	0	0
18	12/09/95	Heavy Snow	0	0	0	0
19	12/13/95	Heavy Snow	0	0	0	0
20	01/18/96	Winter Storm	0	0	0	0
21	01/26/96	Heavy Snow	0	0	0	0
22	02/10/96	Heavy Snow	0	0	0	0
23	02/27/96	Heavy Snow	1	0	0	0
24	04/12/96	Winter Storm	0	0	0	0
25	04/29/96	Winter Storm	0	0	0	0
26	11/01/96	Heavy Snow	0	0	0	0

Table 6 233 Snow and Ice Events 1950 – 2020 (NCEI)						
	Date	Type	Death	Injury	Property Damage	Crop Damage
27	11/09/96	Heavy Snow	0	0	0	0
28	12/23/96	Heavy Snow	0	0	0	0
29	01/04/97	Winter Storm	0	0	0	0
30	01/09/97	Winter Storm	0	0	0	0
31	01/24/97	Heavy Snow	0	0	750K	0
32	03/13/97	Winter Storm	0	0	0	0
33	11/09/97	Heavy Snow	0	0	0	0
34	11/22/97	Heavy Snow	0	0	0	0
35	01/12/98	Heavy Snow	0	0	0	0
36	03/08/98	Heavy Snow	0	0	0	0
37	03/13/98	Heavy Snow	0	0	0	0
38	12/29/98	Heavy Snow	0	0	0	0
39	01/02/99	Winter Storm	0	0	0	0
40	01/06/99	Heavy Snow	0	0	0	0
41	01/09/99	Heavy Snow	0	0	0	0
42	01/23/99	Ice Storm	0	0	0	0
43	11/28/99	Heavy Snow	0	0	0	0
44	01/02/00	Heavy Snow	0	0	0	0
45	01/19/00	Heavy Snow	0	0	0	0
46	01/24/00	Heavy Snow	0	0	0	0
47	02/15/00	Winter Storm	0	0	0	0
48	03/15/00	Winter Storm	0	0	0	0
49	11/19/00	Heavy Snow	0	0	0	0
50	12/16/00	Heavy Snow	0	0	0	0
51	12/18/00	Heavy Snow	0	0	0	0
52	12/20/00	Heavy Snow	0	0	0	0
53	12/26/00	Heavy Snow	0	0	0	0
54	02/08/01	Winter Storm	0	0	0	0
55	12/23/01	Heavy Snow	0	0	0	0
56	01/01/02	Heavy Snow	0	0	0	0
57	01/16/02	Heavy Snow	0	0	0	0
58	02/01/02	Heavy Snow	0	0	0	0
59	02/02/02	Heavy Snow	0	0	0	0
60	02/25/02	Heavy Snow	0	0	0	0
61	03/01/02	Heavy Snow	0	0	0	0
62	03/03/02	Winter Storm	0	0	0	0
63	03/09/02	Winter Storm	0	0	0	0
64	03/09/02	Ice Storm	0	0	0	0
65	03/15/02	Winter Storm	0	0	0	0
66	03/21/02	Heavy Snow	0	0	0	0
67	04/28/02	Heavy Snow	0	0	0	0
68	11/25/02	Heavy Snow	0	0	0	0
69	11/30/02	Winter Storm	0	0	0	0
70	12/18/02	Ice Storm	0	0	0	0
71	12/23/02	Heavy Snow	0	0	0	0
72	01/10/03	Heavy Snow	0	0	0	0

Table 6 233 Snow and Ice Events 1950 – 2020 (NCEI)						
	Date	Type	Death	Injury	Property Damage	Crop Damage
73	01/14/03	Heavy Snow	0	0	0	0
74	02/03/03	Heavy Snow	0	0	0	0
75	04/05/03	Heavy Snow	0	0	0	0
76	12/10/03	Heavy Snow	0	0	0	0
77	01/07/04	Winter Storm	0	0	0	0
78	01/18/04	Winter Storm	0	0	0	0
79	01/22/04	Winter Storm	0	0	0	0
80	01/28/04	Winter Storm	0	0	0	0
81	03/05/04	Heavy Snow	0	0	0	0
82	03/13/04	Heavy Snow	0	0	0	0
83	3/3/02	Winter Storm	0	0	0	0
84	3/10/02	Blizzard	0	0	0	0
85	3/10/02	Winter Storm	0	0	0	0
86	3/15/02	Winter Storm	0	0	0	0
87	11/30/02	Winter Storm	0	0	0	0
88	11/13/03	Blizzard	0	0	0	0
89	1/7/04	Winter Storm	0	0	0	0
90	1/18/04	Winter Storm	0	0	0	0
91	1/22/04	Winter Storm	0	0	0	0
92	1/30/04	Winter Storm	0	0	0	0
93	3/14/04	Heavy Snow	0	0	0	0
94	12/12/04	Winter Storm	0	0	0	0
95	12/18/04	Winter Storm	0	0	0	0
96	12/20/04	Winter Storm	0	0	0	0
97	12/23/04	Heavy Snow	0	0	0	0
98	1/16/05	Heavy Snow	0	0	0	0
99	3/7/05	Winter Storm	0	0	0	0
100	11/16/05	Winter Storm	0	0	0	0
101	11/23/05	Blizzard	0	0	0	0
102	12/1/05	Lake-Effect Snow	0	0	0	0
103	12/10/05	Lake-Effect Snow	0	0	0	0
104	1/24/06	Winter Storm	0	0	0	0
105	2/16/06	Winter Storm	0	0	0	0
106	2/24/06	Heavy Snow	0	0	0	0
107	3/13/06	Blizzard	0	0	0	0
108	1/14/07	Lake-Effect Snow	0	0	0	0
109	1/19/07	Lake-Effect Snow	0	0	0	0
110	1/24/07	Lake-Effect Snow	0	0	0	0
111	1/27/07	Lake-Effect Snow	0	0	0	0
112	2/2/07	Winter Storm	0	0	0	0
113	2/14/07	Lake-Effect Snow	0	0	0	0
114	2/17/07	Lake-Effect Snow	0	0	0	0
115	2/25/07	Winter Storm	0	0	0	0
116	3/1/07	Winter Storm	0	0	0	0
117	4/4/07	Blizzard	0	0	2K	0
118	4/5/07	Winter Storm	0	0	0	0

Table 6
233 Snow and Ice Events 1950 – 2020 (NCEI)

	Date	Type	Death	Injury	Property Damage	Crop Damage
119	11/30/07	Winter Storm	0	0	0	0
120	12/1/07	Winter Storm	0	0	0	0
121	12/1/07	Winter Storm	0	0	0	0
122	1/17/08	Heavy Snow	0	0	0	0
123	1/18/08	Lake-Effect Snow	0	0	0	0
124	1/30/08	Blizzard	0	0	0	0
125	2/10/08	Blizzard	0	0	0	0
126	2/17/08	Winter Storm	0	0	0	0
127	2/29/08	Lake-Effect Snow	0	0	0	0
128	3/1/08	Lake-Effect Snow	0	0	0	0
129	3/31/08	Blizzard	0	0	0	0
130	4/1/08	Blizzard	0	0	0	0
131	4/11/08	Winter Storm	0	0	0	0
132	11/8/08	Lake-Effect Snow	0	0	0	0
133	11/16/08	Lake-Effect Snow	0	0	0	0
134	11/19/08	Lake-Effect Snow	0	0	0	0
135	12/4/08	Lake-Effect Snow	0	0	0	0
136	12/6/08	Blizzard	0	0	0	0
137	12/6/08	Winter Storm	0	0	0	0
138	12/19/08	Lake-Effect Snow	0	0	0	0
139	1/8/09	Lake-Effect Snow	0	0	0	0
140	2/2/09	Lake-Effect Snow	0	0	0	0
141	2/18/09	Winter Storm	0	0	0	0
142	2/18/09	Blizzard	0	0	0	0
143	2/20/09	Winter Storm	0	0	0	0
144	2/21/09	Lake-Effect Snow	0	0	0	0
145	2/26/2009	Blizzard	0	0	0	0
146	3/10/09	Winter Storm	0	0	0	0
147	12/8/09	Winter Storm	0	0	0	0
148	1/28/10	Lake-Effect Snow	0	0	0	0
149	2/23/10	Lake-Effect Snow	0	0	0	0
150	12/1/10	Lake-Effect Snow	0	0	0	0
151	12/4/10	Lake-Effect Snow	0	0	0	0
152	12/11/10	Winter Storm	0	0	0	0
153	1/6/11	Lake-Effect Snow	0	0	0	0
154	1/31/11	Lake-Effect Snow	0	0	0	0
155	2/9/11	Lake-Effect Snow	0	0	0	0
156	11/9/11	Winter Storm	0	0	0	0
157	12/9/11	Winter Storm	0	0	0	0
158	1/1/12	Winter Storm	0	0	0	0
159	1/1/12	Blizzard	0	0	0	0
160	1/17/12	Lake-Effect Snow	0	0	0	0
161	1/19/12	Lake-Effect Snow	0	0	0	0
162	1/28/12	Lake-Effect Snow	0	0	0	0
163	2/29/12	Winter Storm	0	0	0	0
164	3/2/12	Winter Storm	0	0	0	0

Table 6
233 Snow and Ice Events 1950 – 2020 (NCEI)

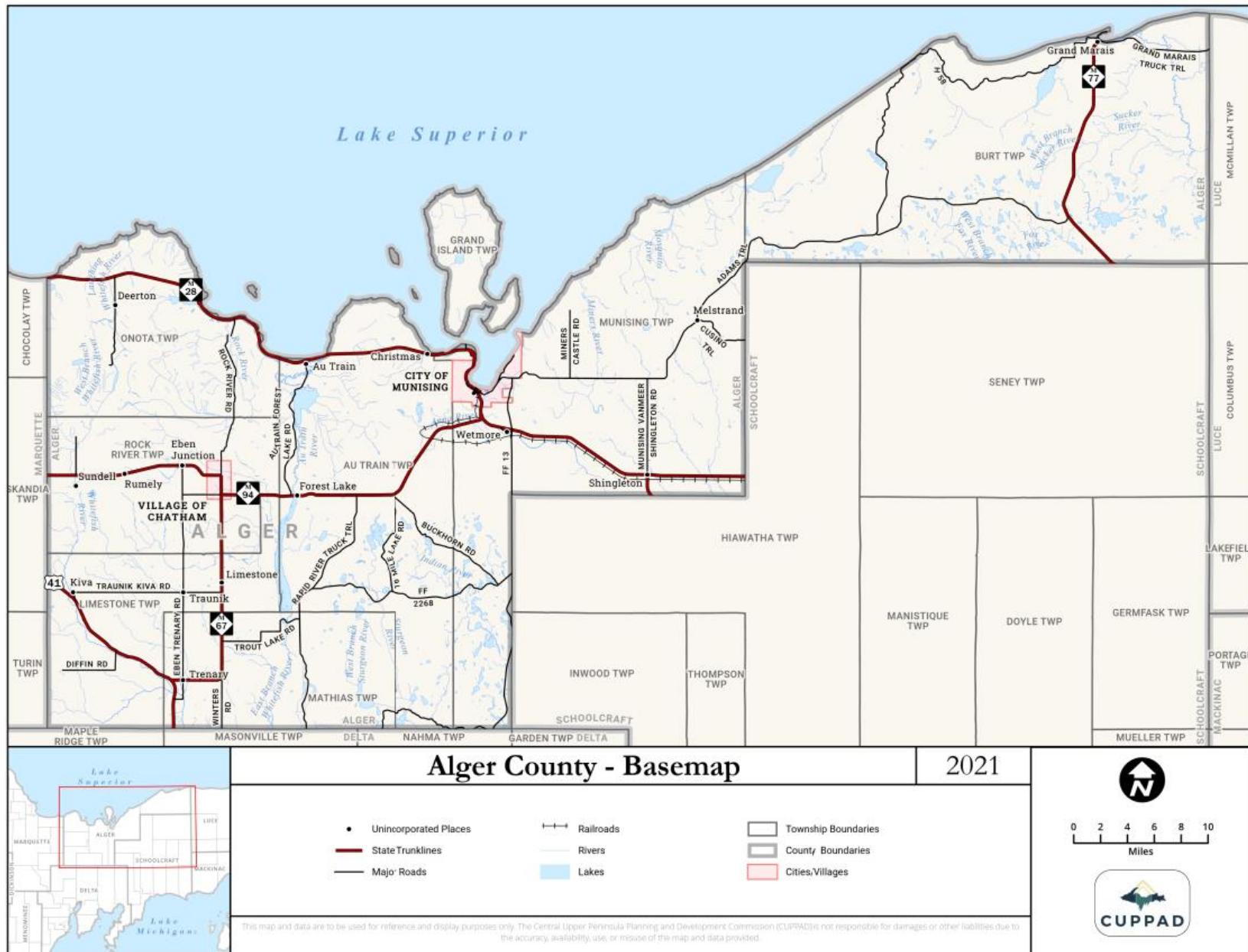
	Date	Type	Death	Injury	Property Damage	Crop Damage
165	11/23/12	Winter Storm	0	0	0	0
166	11/25/12	Lake-Effect Snow	0	0	0	0
167	12/20/12	Winter Storm	0	0	5K	0
168	1/19/13	Lake-Effect Snow	0	0	0	0
169	1/30/13	Winter Storm	0	0	0	0
170	1/31/13	Winter Storm	0	0	0	0
171	2/1/13	Lake-Effect Snow	0	0	0	0
172	2/15/13	Lake-Effect Snow	0	0	0	0
173	2/19/13	Blizzard	0	0	0	0
174	2/18/13	Winter Storm	0	0	0	0
175	3/18/13	Winter Storm	0	0	0	0
176	4/11/13	Winter Storm	0	0	0	0
177	12/3/13	Winter Storm	0	0	0	0
178	12/6/13	Lake-Effect Snow	0	0	0	0
179	12/10/13	Lake-Effect Snow	0	0	0	0
180	1/3/14	Winter Storm	0	0	0	0
181	1/23/14	Lake-Effect Snow	0	0	0	0
182	1/24/14	Lake-Effect Snow	0	0	0	0
183	1/26/14	Blizzard	0	0	0	0
184	1/30/14	Winter Storm	0	0	0	0
185	3/27/14	Winter Storm	0	0	0	0
186	4/13/14	Winter Storm	0	0	0	0
187	11/10/14	Winter Storm	0	0	0	0
188	11/13/14	Lake-Effect Snow	0	0	0	0
189	11/17/14	Lake-Effect Snow	0	0	0	0
190	11/19/14	Lake-Effect Snow	0	0	0	0
191	11/24/14	Lake-Effect Snow	0	0	0	0
192	12/27/14	Winter Storm	0	0	0	0
193	2/14/15	Blizzard	0	0	0	0
194	11/21/15	Lake-Effect Snow	0	0	0	0
195	12/28/15	Winter Storm	0	0	0	0
196	1/2/16	Lake-Effect Snow	0	0	0	0
197	1/16/16	Lake-Effect Snow	0	0	0	0
198	2/12/16	Lake-Effect Snow	0	0	0	0
199	11/19/16	Winter Storm	0	0	0	0
200	12/8/16	Lake-Effect Snow	0	0	0	0
201	12/29/16	Lake-Effect Snow	0	0	0	0
202	1/5/17	Lake-Effect Snow	0	0	0	0
203	1/11/17	Winter Storm	0	0	0	0
204	2/7/17	Winter Storm	0	0	0	0
205	12/11/17	Lake-Effect Snow	0	0	0	0
206	12/15/17	Lake-Effect Snow	0	0	0	0
207	12/25/17	Lake-Effect Snow	0	0	0	0
208	12/29/17	Lake-Effect Snow	0	0	0	0
209	1/22/18	Winter Storm	0	0	0	0
210	3/31/18	Winter Storm	0	0	0	0

Table 6 233 Snow and Ice Events 1950 – 2020 (NCEI)						
	Date	Type	Death	Injury	Property Damage	Crop Damage
211	4/15/18	Winter Storm	0	0	0	0
212	11/9/18	Winter Storm	0	0	0	0
213	1/7/19	Winter Storm	0	0	0	0
214	1/24/19	Winter Storm	0	0	0	0
215	1/26/19	Winter Storm	0	0	0	0
216	1/29/19	Blizzard	0	0	0	0
217	2/4/19	Ice Storm	0	0	0	0
218	2/7/19	Winter Storm	0	0	0	0
219	2/7/19	Blizzard	0	0	0	0
220	2/12/19	Winter Storm	0	0	0	0
221	2/14/19	Winter Storm	0	0	0	0
222	2/20/19	Winter Storm	0	0	0	0
223	2/24/19	Winter Storm	0	0	0	0
224	2/24/19	Blizzard	0	0	0	0
225	11/7/19	Winter Storm	0	0	0	0
226	11/10/19	Winter Storm	0	0	0	0
227	11/27/19	Winter Storm	0	0	40k	0
228	12/1/19	Winter Storm	0	0	0	0
229	12/12/19	Winter Storm	0	0	0	0
230	12/30/19	Winter Storm	0	0	0	0
231	1/17/20	Winter Storm	0	0	0	0
232	3/5/20	Winter Storm	0	0	0	0
233	4/12/20	Winter Storm	0	0	5k	0
Total			0	0	\$5.856 M	0

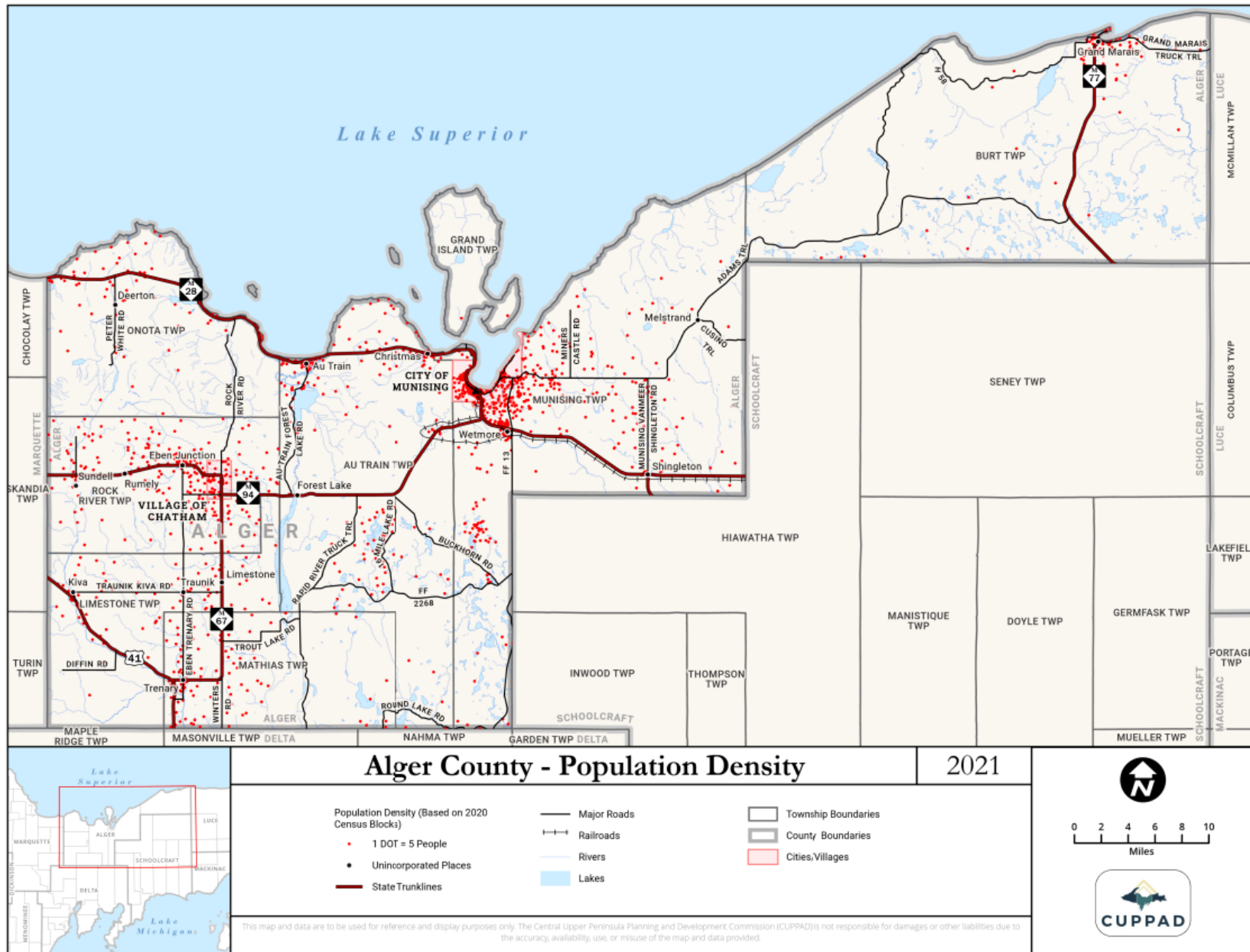
APPENDIX F

Alger County Maps

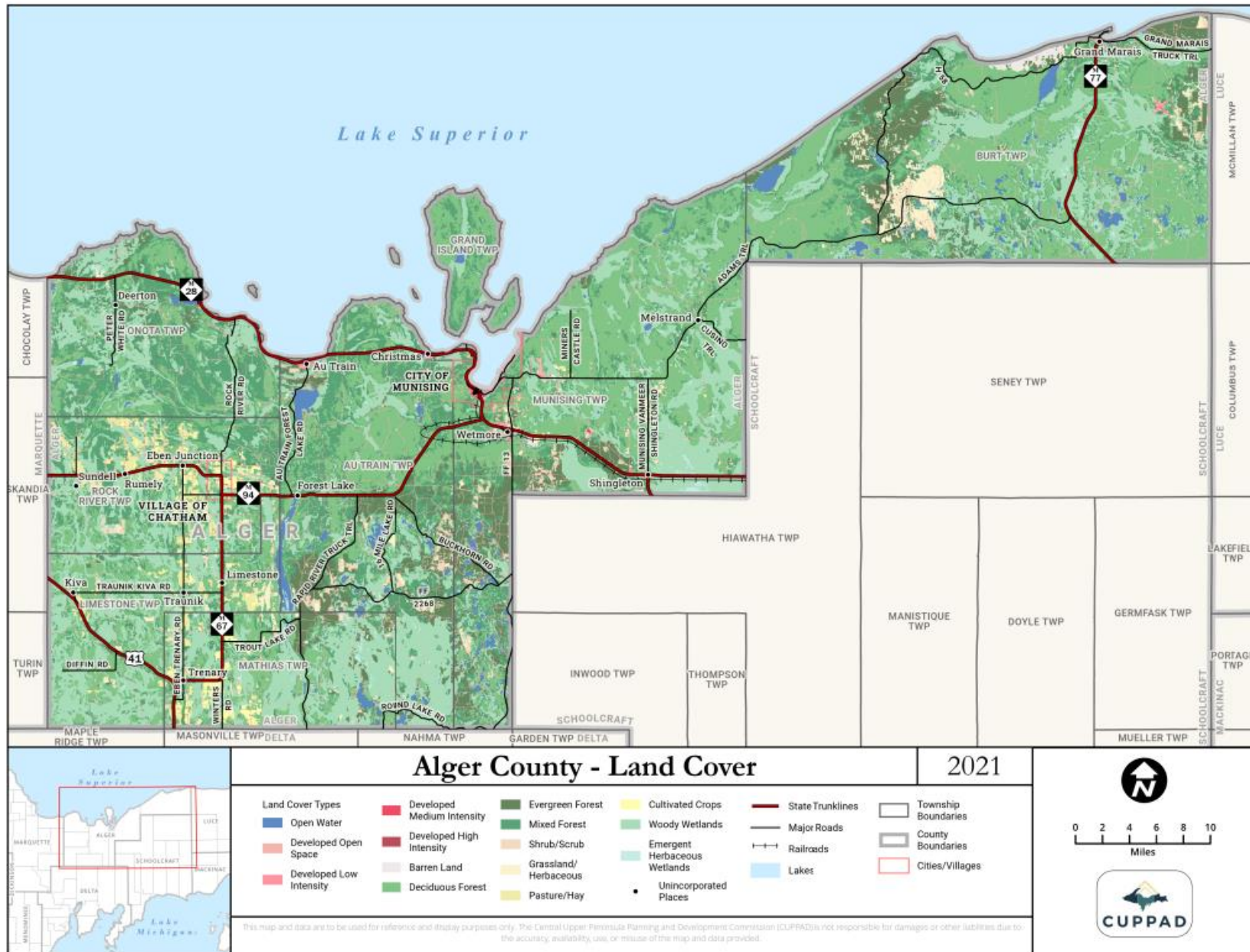
Map 1



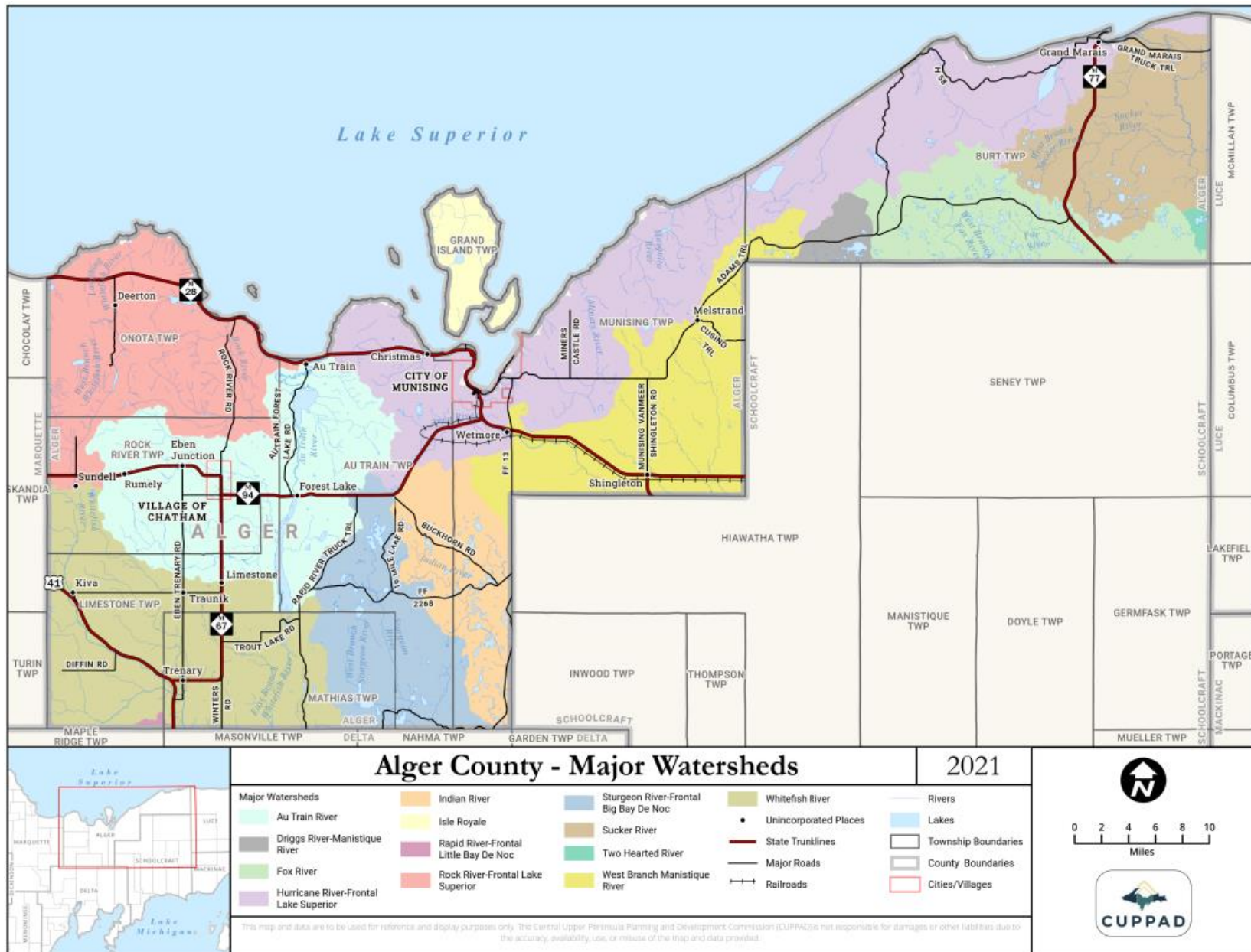
Map 2



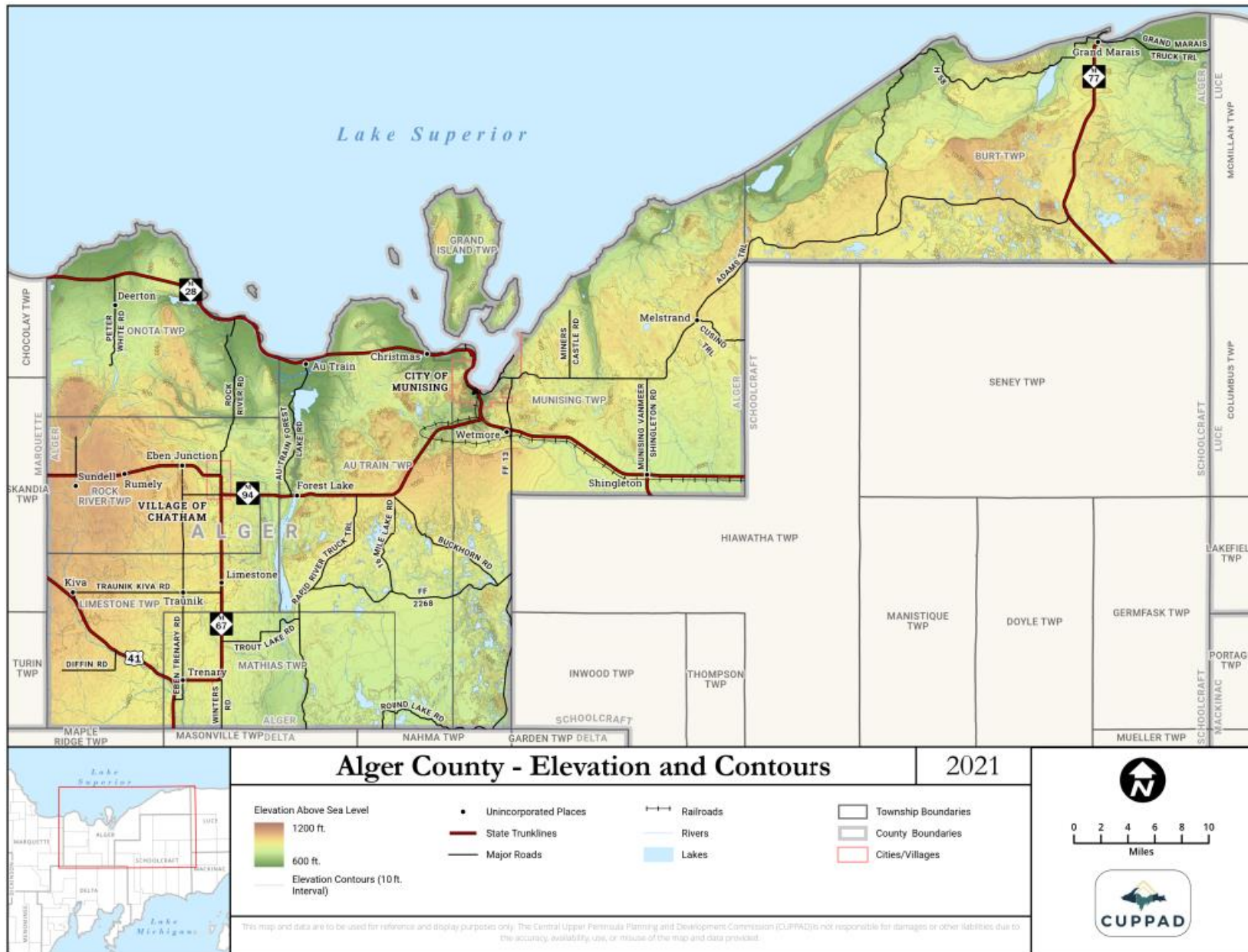
Map 3



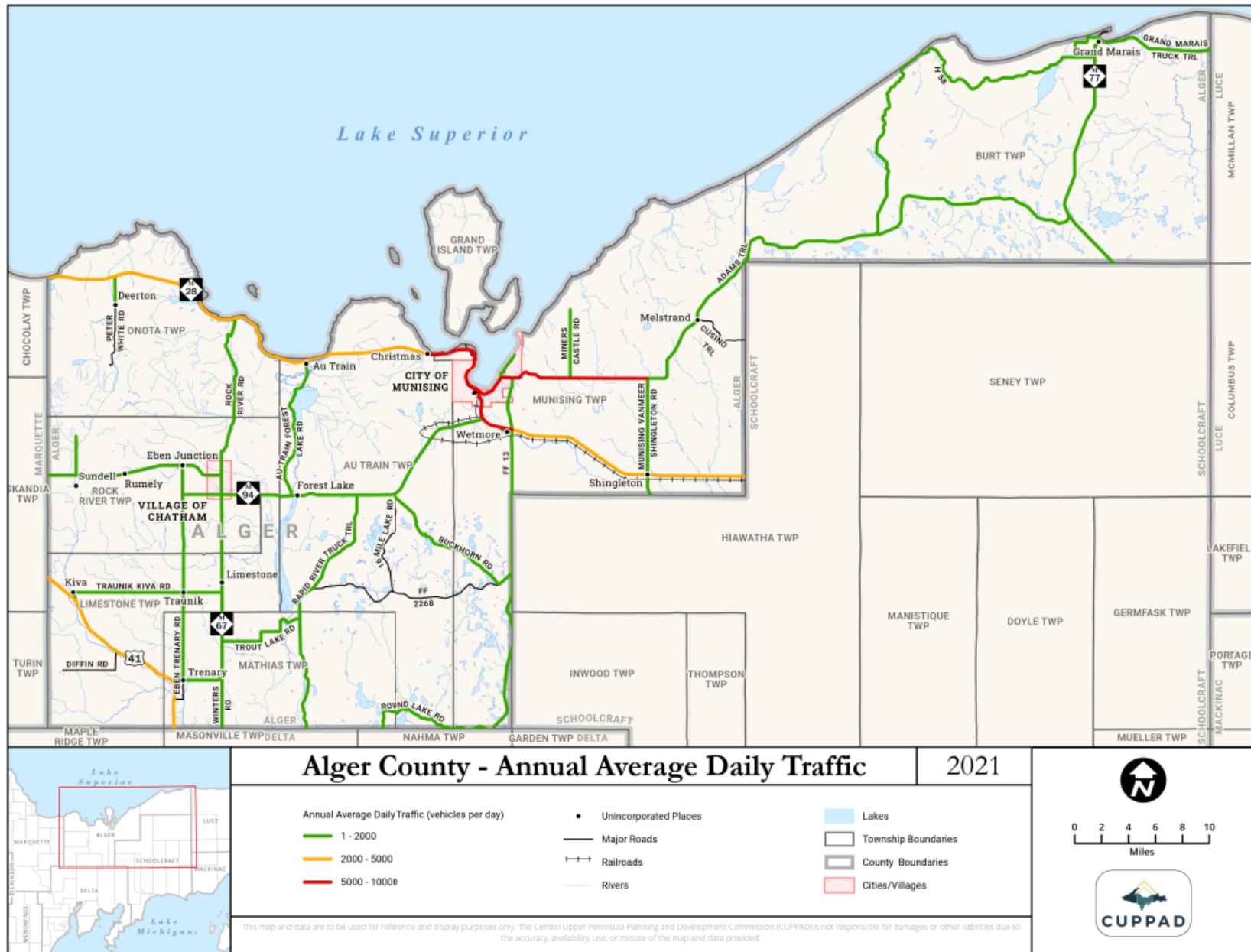
Map 4



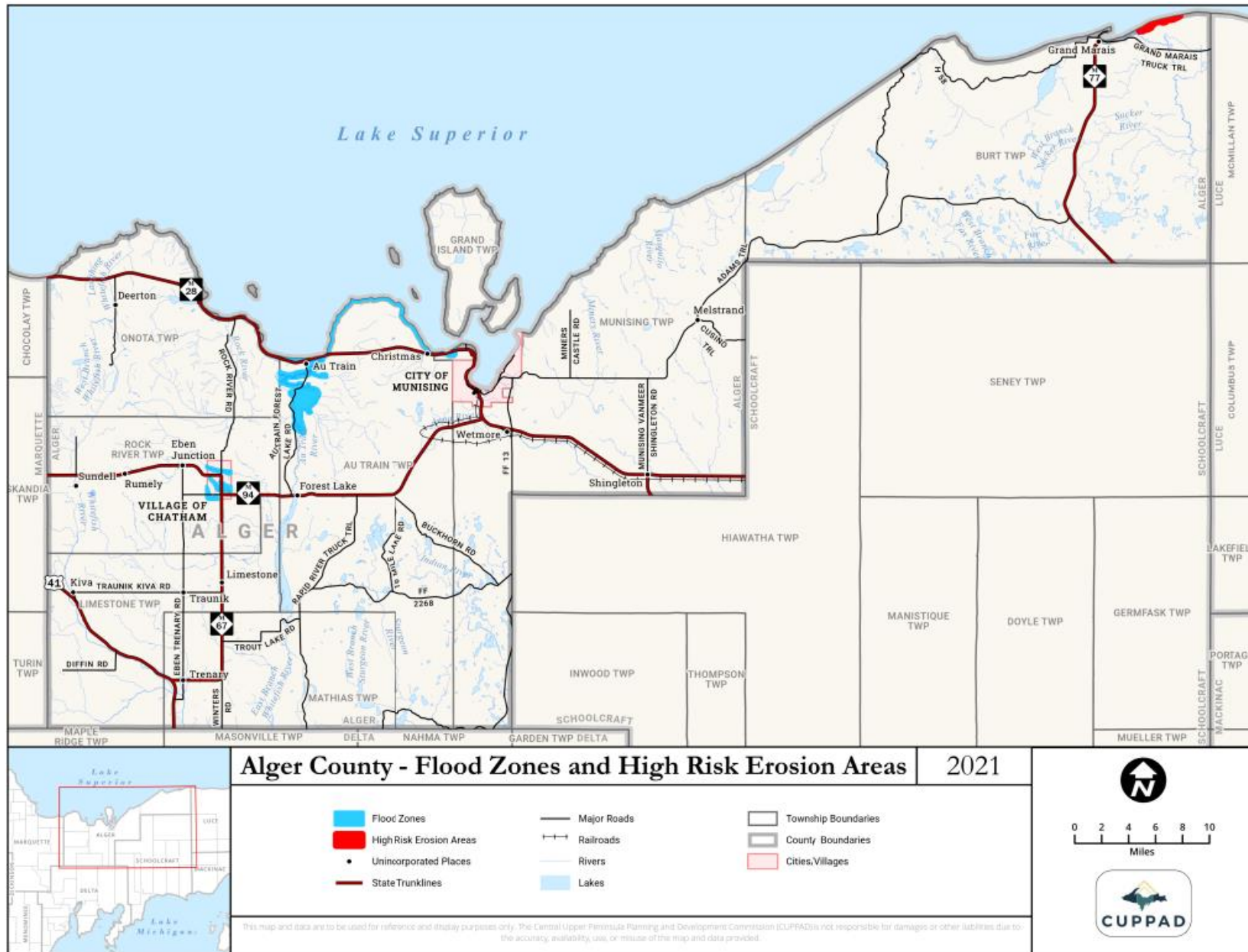
Map 5



Map 6

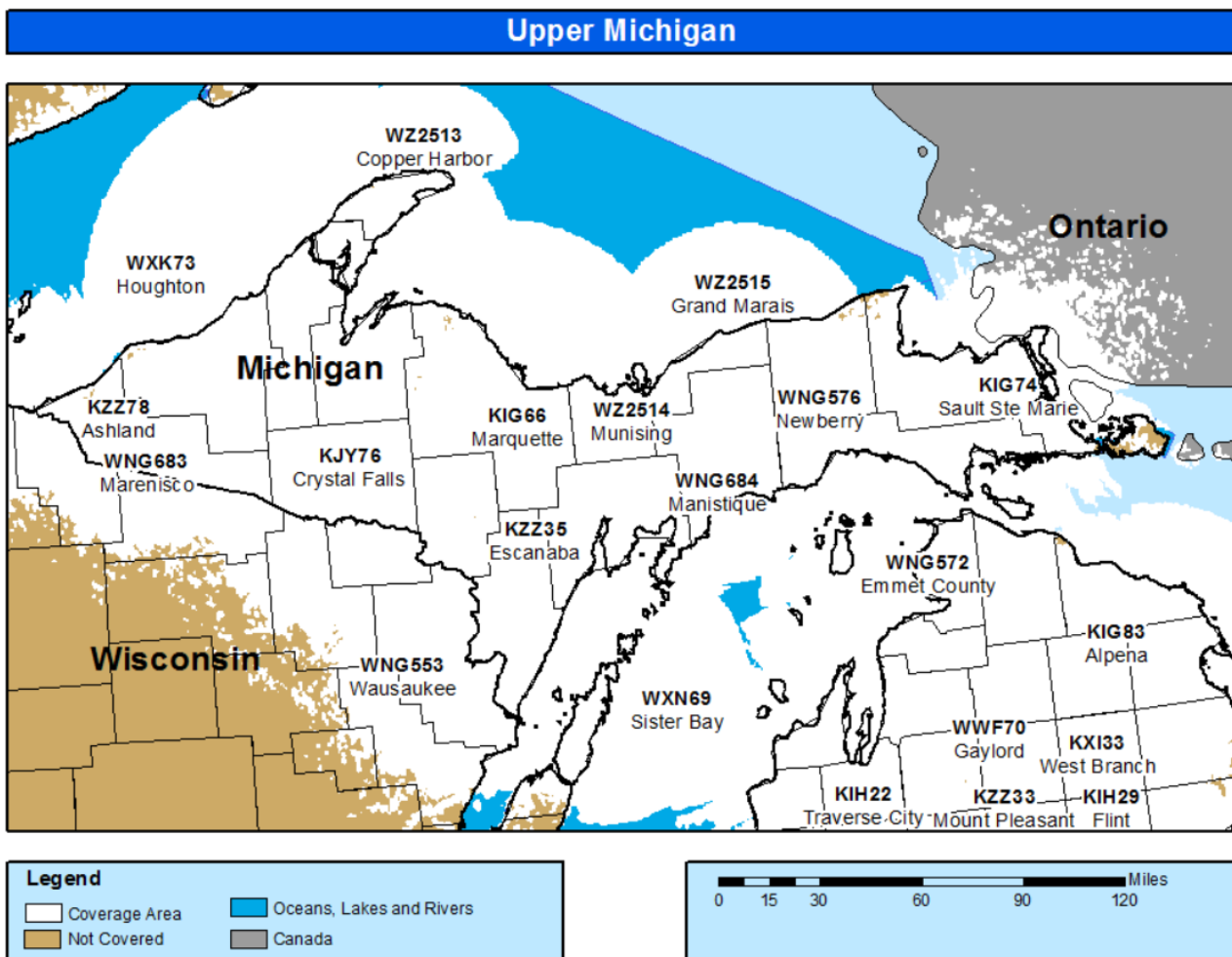


Map 7



NOAA Weather Radio Coverage

Map 8

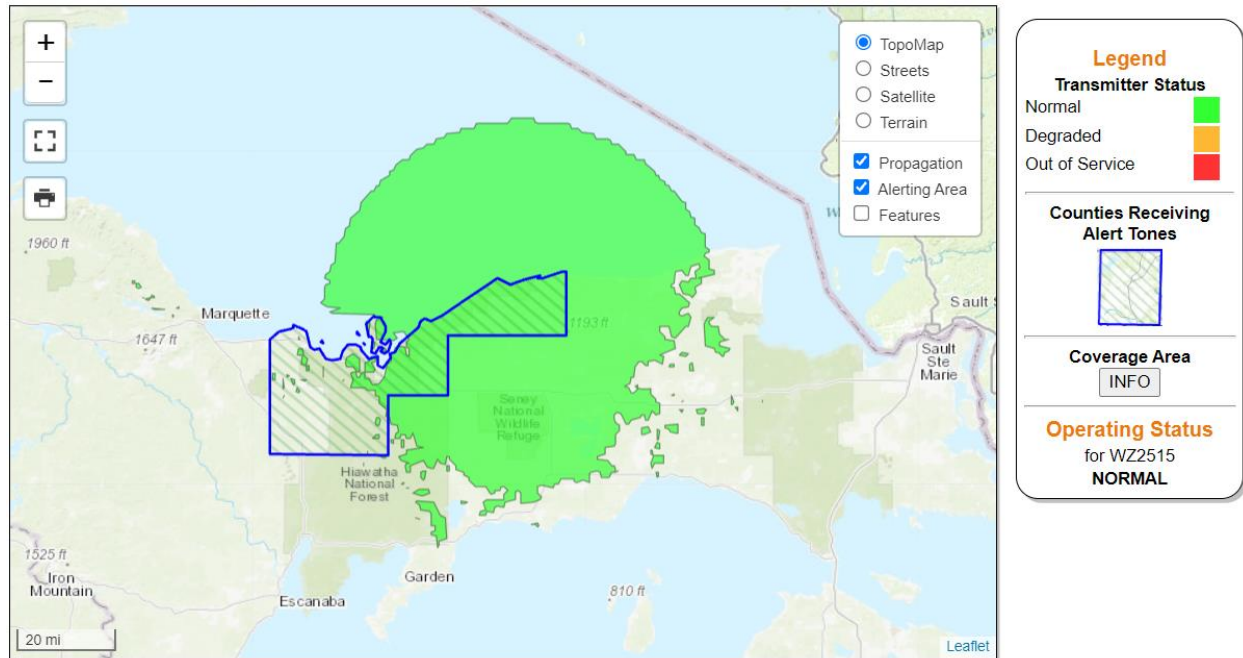


Source: NOAA, 2021

NOAA Weather Radio Coverage

Map 8A

NOAA Weather Radio – WZ2515 162.425 Grand Marais



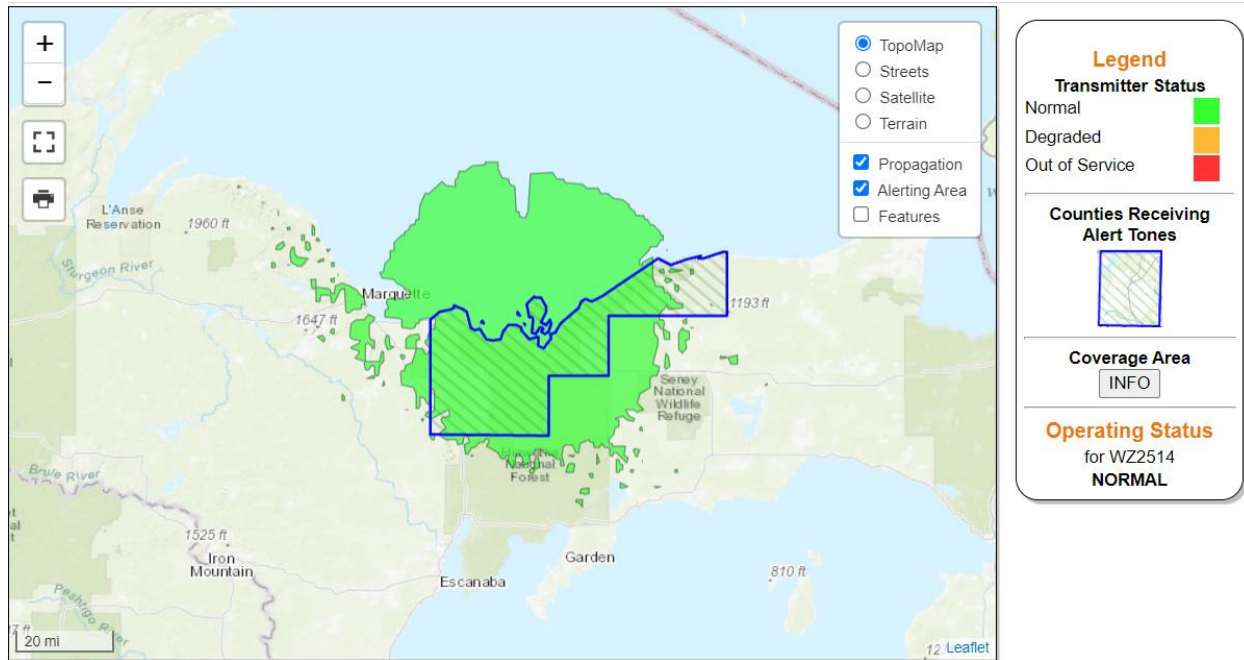
Transmitter Details	
Call Sign	WZ2515
Transmitter	Grand Marais
Frequency	162.425
State	Michigan
Site Location	Grand Marais, MI
Operating Status	NORMAL
Weather Forecast Office	Marquette MI

WZ2515 Counties Receiving Alert Tones			
COUNTY	STATE	SAME	REMARKS
Alger	Michigan	026003	

NOAA Weather Radio Coverage

Map 8B

NOAA Weather Radio – WZ2514 162.475 Munising



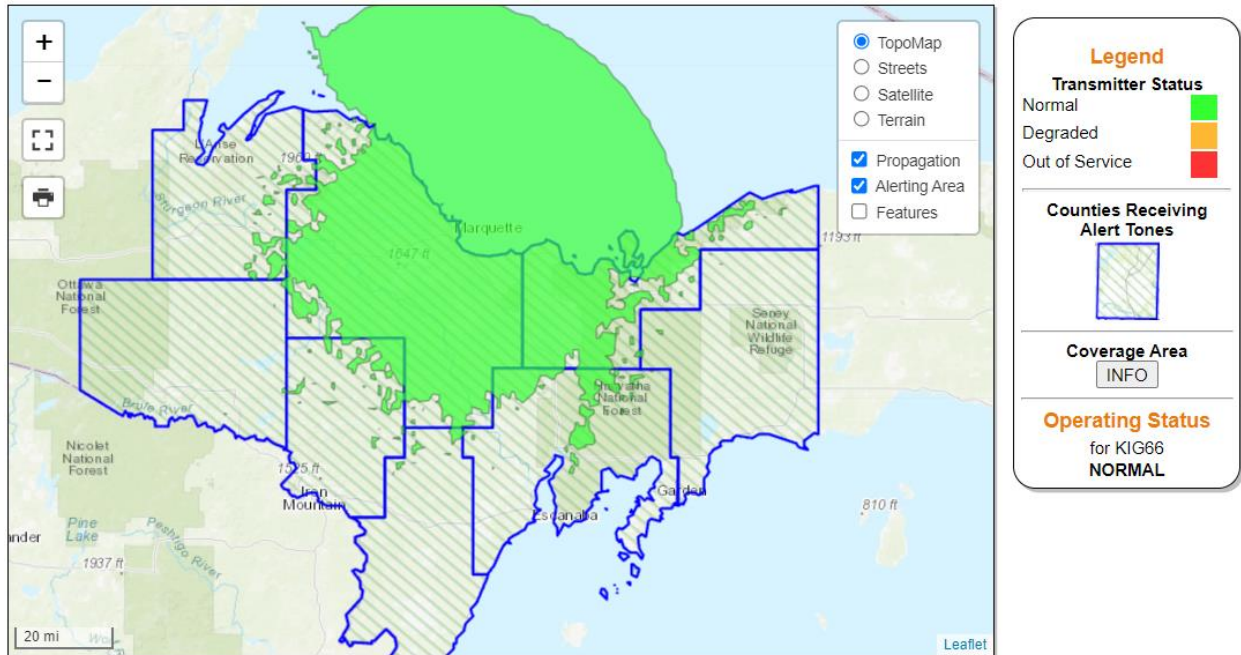
Transmitter Details	
Call Sign	WZ2514
Transmitter	Munising
Frequency	162.475
State	Michigan
Site Location	Alger County, MI
Operating Status	NORMAL
Weather Forecast Office	Marquette MI

WZ2514 Counties Receiving Alert Tones			
COUNTY	STATE	SAME	REMARKS
Alger	Michigan	026003	

NOAA Weather Radio Coverage

Map 8C

NOAA Weather Radio – KIG66 162.550 Marquette



Transmitter Details	
Call Sign	KIG66
Transmitter	Marquette
Frequency	162.550
State	Michigan
Site Location	Negaunee, MI
Operating Status	NORMAL
Weather Forecast Office	Marquette MI

KIG66 Counties Receiving Alert Tones			
COUNTY	STATE	SAME	REMARKS
Alger	Michigan	026003	W1/2
Baraga	Michigan	026013	E1/2
Delta	Michigan	026041	
Dickinson	Michigan	026043	N1/2
Iron	Michigan	026071	
Marquette	Michigan	026103	
Menominee	Michigan	026109	
Schoolcraft	Michigan	026153	